The Builder.

VOL. LXXIX., No. 3502. AUGUST 18, 1900.

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Gardening from an Architectural Point of View.

THE last few years may be said to have been, in this country, the epoch of the revival of the interest in gardening as a form of artistic invention, more especially in connexion with and in relation to dwelling houses. The number of books on the subject is one outward indication of this. The mere landscape gardener, with his sham rivers and bridges, his sinuous walks, his picturesquely arranged clumps of trees, and his artificial landslips and geological features, has had his day. Mr. Milner's book, reviewed in our columns a few years ago, was an attempt to reaffirm the landscape gardener which met with little sympathy or encouragement as far as the author's notions of garden design were concerned, though it contains valuable information in regard to the purely gardening work of selecting and planting trees and shrubs. Since then two well-known architects, Mr. Blomfield and the late J. D. Sedding, produced books on the subject, thus asserting the architect's claim to interpose; and Mr. Mawson, the author of the latest important work on garden-making,* calls himself on the title-page "garden architect"; a title in itself significant of the change of public attitude on the subject. The "landscape gardener," in short, though still existing, has became obsolete.

Mr. Mawson, whose book is far in advance of anything produced by professed garden artists since Repton, draws a broad and very good distinction, in his introductory chapter, between the old and the modern or recent school of garden-makers; the older men, before the days of Brown, were idealists, engaged in creating something of their own; Brown and his followers were realists, considering a garden only as a contrived imitation of the irregularity of Nature. Repton, however, must not be classed precisely with these; he was a man of genius, and though he did not escape the mistakes of the school, he was far beyond any of them in artistic perception and in grasp of his subject, and his great book will always be worth study.

As Mr. Mawson rightly points out, Sedding's observation, "A garden is man's report of earth at her best," however charming in a literary sense, does not quite express the main point or include the whole truth. A garden may be what Sedding called it, but it should be something more; it should be a creation by man out of materials furnished by Nature. That is the true condition of an idealist's garden.

The process of laying out a garden on new ground is well illustrated by the author, in his chapter on "Choice of a Site and its Treatment," by taking an actual site in its main features from the ordnance map, only slightly altering it to avoid identification, and going through the gradual process of placing the house and garden on it, commencing with considering the site in regard to larger features which cannot be much altered—contour of land, position of woods, &c., and consequent on these the various lines of vista from the house, which will partly determine its situation and orientation. Having considered the main features of the site, the next thing is to consider the plan of the house and of the accessory buildings; "and herein," the author observes, "lies a great difficulty with which the garden designer has to contend; for directly he begins to inquire into the planning and arrangement of the house, the architect looks upon him with suspicion, or his client thinks he is endeavouring to enlarge the scope of his work beyond the area in respect to which he consulted him." This latter may be true; clients are strange creatures. But surely there are very few architects who, if the garden designer asked for a plan of the house before laying out the garden, would not say that he showed his good sense in doing so. A block plan is not sufficient, for the position of the windows of the principal rooms, and of the entrances to the various quarters of the house, must or ought to influence the design of the garden. The more probable point of dispute between the house architect and the "garden architect" (since the author adopts that term) would be, in the present day, that the house architect would himself wish to have a hand in the designing of the portions of the garden immediately adjoining the house; and he has a claim to this too, since the effect of his building must depend a good deal upon the treatment of these immediate surroundings. In fact, we should say that the garden architect should, as far as the immediate surroundings of the house are concerned, work under the house architect and have to satisfy him; but we fear this view will not suit Mr. Mawson. They ought at all events, however, to work in collaboration.

The imaginary house on this estate is given in detail. The manner in which the stable court is connected with the circular carriage court before the main porch of the house is very good, as it preserves the dignity of appearance of the carriage court by keeping a symmetrically disposed exit and entry; but this part of the treatment is very much simplified by the fact that dining-room, drawing-room, and morning-room, are all placed facing the same way (S.S.E.) on the opposite side of the house to the entrance court.* They are obviously placed for the *prospect*, and that is what a garden architect always thinks of; whereas an architect considers, or ought to consider, *aspect* as well, which is fully as important, if it be not even the more important of the two. In working out the further extent of the garden after leaving the immediate vicinity of the house, the author thinks the best plan is to work outward from the house, studying the sectional lines of

* "The Art and Craft of Garden-Making." By Thomas H. Mawson, garden architect. London: B. T. Batsford. 1900.

* We observe, by the way, that in the general plan of the grounds and house, forming plate 5, the north point has been revolved through nearly a quarter of a circle, so that in this case the house faces S.S.W. instead of S.S.E. which is still worse for the three entertaining rooms; the dining-room would have too much sun, and the morning-room none.

the land, and arranging the terraces and gardens so as to preserve some indication of the original lie of the ground. In the plan showing the estate more at large with the house on a small scale, there is an irregularly-shaped lake, and the plantations which nearly surround it are traversed by that kind of artificially winding walk which is the special invention of the landscape gardener, and which seems to us to have no connexion with the functions of a "garden architect;" but the irregularity of lines of lake and walk is cleverly dominated by a straight walk between thick clipped hedges, which starts from a circular parterre with a central fountain near the house, and is terminated on the margin of the lake by a small circular house with steps round each side of it down to the margin of the lake, which is responded to by another circular erection and a flight of steps on the opposite side of the lake. The whole effect is illustrated in the drawing forming the frontispiece to the book, of which we give here a reduced reproduction. This manner of connecting the irregular portion of the grounds with the house and the formal garden by a formal walk and structures symmetrically placed in regard to each other is an idea capable of many applications, and is worth bearing in mind. As to the irregular lake, the author defends it on the ground that it was not artificially excavated, but is simply a use made of a natural feature of the ground; in other words, there was an irregular depression in the land here, and it is filled up with water. That is a reasonable excuse for the lake; though we confess that we should be more pleased to find a formal and symmetrically planned piece of water at the end of the clipped-hedge walk. It must be admitted however that the cost of making it would be very much greater—in fact, except in the case of a client of more than average wealth, would be prohibitive.

The important subject of fencing is very well treated by Mr. Mawson in a chapter specially devoted to it. While of course not adopting the old craze about invisible fences which gave rise first to the "ha-ha" and then to the wire fence, the author suggests that a medium course may be found in the adoption of fences with intermittent piers or solids between which wires can be strained, so as to give some character to the fence and render it important in the garden design. The same object can also be attained by open wooden railing between widely spaced stone piers. Two or three sketches given of this kind of fence are excellent as suggestions, and look as if they came from the hand of the well-known architectural artist who has drawn the principal plates. The suggestions for garden gates are also good; but the larger iron gates on page 27 are very poor, as the detail sketch more emphatically shows, the main fault being realistic foliage—a fault worst of all in a garden gate, where it has to compete with real foliage. But the author is quite right in endeavouring to suggest, as he puts it, that owners of gardens should give their attention to the formation of a form of fence which would be an improvement rather than a detriment, "instead of concluding that everything that can be done is shown in the hurdle-maker's catalogue." The wire fence may have its commercial value on a farm, as a fence which does not interfere with supervision and does not shut out sunshine from growing stuff; but in connexion with gardens or pleasure grounds of any kind it is one of the most unpicturesque and depoetising divisions of land ever invented.

The cognate subject of hedges is treated in another portion of the book. The author, we are glad to say, does not advocate the fantastic hedge-clipping of older days, but gives the sensible advice that simple forms are the best, not only because they serve their purpose without show or pretence, but also for the practical reason that "they are much more likely to be kept in good form than those requiring great skill in clipping." Some simple and broad forms of varied outline may however be used without this drawback. All imitations of natural or artificial objects in cut hedgerows are poor taste and out of place, however they may be archæologically interesting when found in ancient gardens.

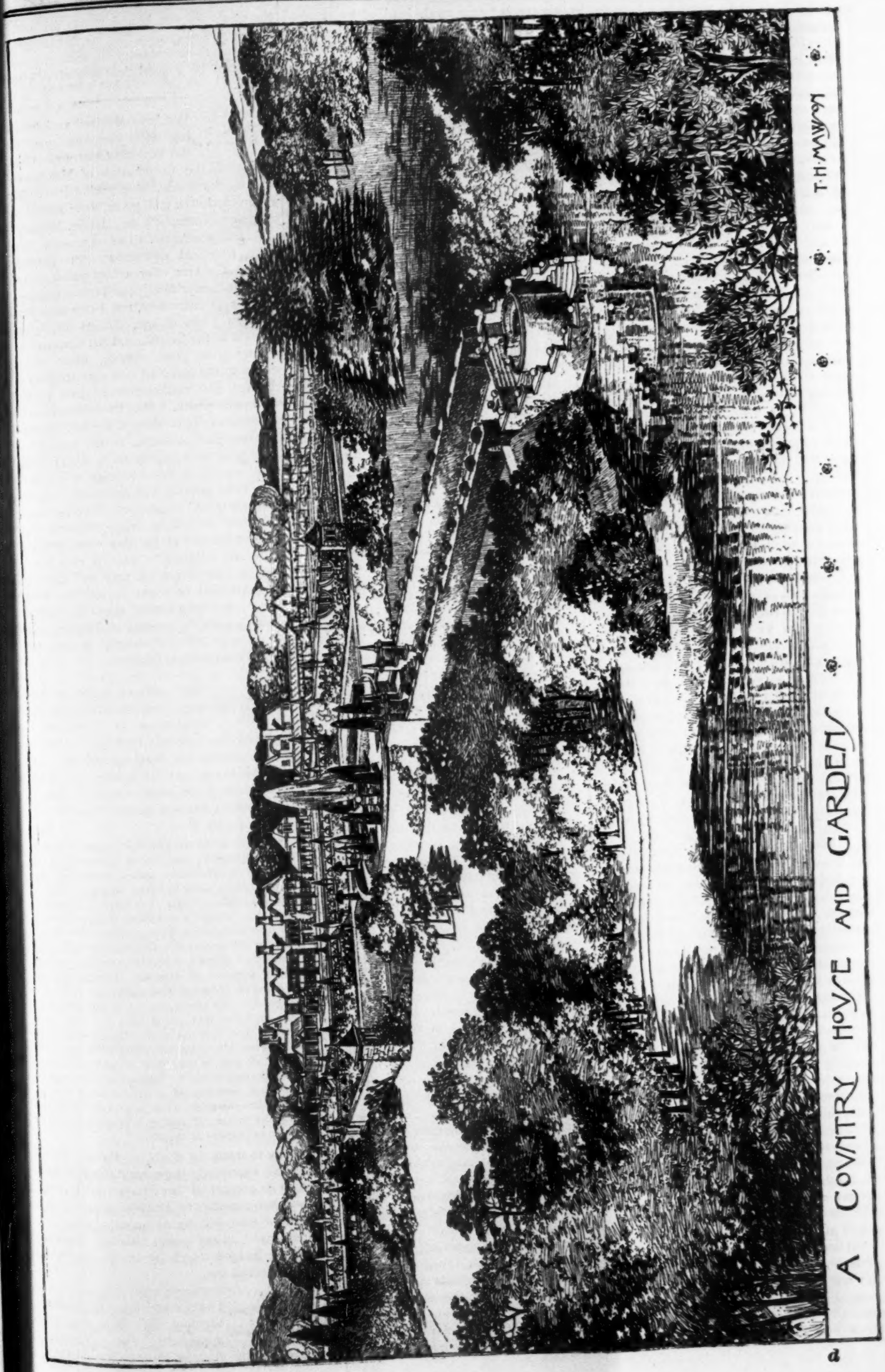
A country house presupposes carriages and their means of access. It may be true that the time-honoured "loop" shape into which the majority of drives expand at the house entrance follows the lines which a carriage would naturally take in coming up to and turning away from the door, but it is a wretched, ugly way of laying out the lines of the ground, and we prefer either to see a complete circle or semi-circle drive, geometrically laid out, or a "carriage court" large enough for turning about without following the lines of a border. The question of single or double lodges at the gate is one of state and importance mainly. There should in fact be no duplicate lodges; a cottage on each side of the entrance gates, when the only object is to provide an abode for the gate-keeper, is absurd; it is so palpable that the second one is added merely to balance the other. For a house and estate of average size and importance a single lodge, adjoining the gate, is a sufficient and suitable provision; a second one serves no practical purpose. For a large mansion, a state house, the most suitable and effective form of lodge is a larger and more formal building with an arched entrance through it, the two sides being connected by the story over the arch. Such a lodge is one house, and is both more dignified and more practical than a duplicate. It affords, moreover, much of suggestion to the architectural designer.

Let not the owner of a flat site despair of a good garden. The treatment will be different from that suggested by an undulating or sloping section of land, but it may be almost equally effective in its own way. What were the natural capabilities of Versailles? Level lawns, and parterres, and water, have still their effect, even when there are no declivities to afford the opportunity for terraces on different levels. A beautifully kept, clean shaven lawn, as the author observes, is one of the greatest charms of an English garden; and in regard to it he gives a useful piece of practical advice:—

"A lawn, like a meadow, requires to be in good heart, and must, therefore, be prepared with a sufficient quantity of good soil. To prevent worms, however, a layer of sharp clean ashes or coke breeze may be laid under the turf, or, where the lawn is to be sown down, under the top spit of soil. Another error is that of neglecting proper drainage. This is the most important factor in the maintenance of good turf, because if the ground retains too much moisture, the grass soon grows yellow and is really apt to burn up sooner than well-drained ground. This is explained by the fact that in wet ground the roots are near the surface, while on dry warm soils they go down deep."

It is seldom indeed that we see the most made of the opportunities afforded, in the construction of summer-houses and bridges in a garden or park, of designing something entirely with an eye to beauty, and to its relation to the surroundings of lawns, foliage, and water. What are called summer-houses rarely rise above the commonplace in architectural character; and they frequently fall below it, from a mistaken notion that, being in the midst of foliage, they should be treated in a kind of naturalistic or "rustic" manner, with the idea of harmonising with their surroundings, whereas they should contrast with their surroundings. A summer-house should be a little bit of refined artificial design introduced amid the work of Nature. A mere arbour is another thing—that is not architecture; but a summer-house should be architectural. The examples given in the book before us are not much better than usual; but the author is on the right track in regard to these things, especially in condemning those foolish things called rustic bridges, which, as he says, are not only a mistake in point of taste but, owing to the insufficient way in which they are almost necessarily put together, are constantly requiring repair. We may add that where over a deep stream or a waterfall they may be a source of danger from the unsuspecting visitor leaning against the "rustic" parapet when it is not in a state to resist pressure. A good example is given on page 65 of an oak bridge which, while soundly constructed, is quite in keeping with an out-of-the-way and informal corner. We are also entirely in accordance with Mr. Mawson in his remark as to the unsatisfactory style of most "catalogue" garden seats, though whether the village carpenter of the present day would produce anything better, as the author suggests, may be doubtful; what is called (and sometimes miscalled) education has penetrated everywhere so much, that probably the village carpenter himself will think it his duty to do something consciously "ornamental" for a garden seat. Mr. White, of Bedford, with the assistance of one or two architects, has started something more to the purpose in the way of garden seats, and we should think that the one shown in Mr. Mallows's pretty sketch of "circular garden seat and lead figure," on page 69 of the book, came from that quarter.

On the important question of the treatment of water we find that in regard to miniature lakes the author does recommend architecturally treated and formal ponds rather than quasi-natural ones; but he does not seem quite to recognise that the principle is just as good when you come to artificial water on a larger scale, and that it is really only cost that should stand in the way. If a lake is to be artificially formed without making it part of a formal design, he is certainly quite right in recommending that it should be done by merely flooding a natural depression of the ground, without making artificial capes and bays on a small scale. But even this can only be called a make-shift. The only natural water worth having in a park is a real lake on a large scale, pre-existent and merely taken into the boundary. The author gives a plan of Wolverhampton House and grounds, where the house stands centrally at the head of a piece of ground



A COUNTRY HOUSE AND GARDENS

T. H. MAWSON

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1,000 ft. wide and 1,500 ft. long, bounded by straight avenues sweeping round in a true semi-circle at the end opposite where the house is placed. Except the formal garden immediately fronting the house, this space is occupied by an irregular wilderness treatment with artificially winding walks (not geometrically laid out) and what is euphuistically called a "lake," formed by filling in an irregular depression (partly consisting of spoil banks) with water. But on applying the scale we find this "lake" is 500 ft. long and averages 100 ft. wide. What is the use of calling a thing like that a "lake"? Treated as a formal piece of water it would have been large enough for effect; as a quasi-natural lake it is futile. And what an opportunity—what an actual suggestion—is offered for a stately symmetrical laying out of the ground, by the mere shape of the bounding avenue with its great semicircle, axial with the house at the upper end! We should call this a great opportunity thrown away. At all events, let us not hear a straggling pond 500 ft. long called a "lake"; it is a misapplication of terms. Nothing under a mile long by half a mile wide can be called and treated as a lake—and that is but a small one. Such attempts at irregular lake scenery on a diminutive scale only make one melancholy.

We recommend to the attention of the owners of estates Mr. Mawson's plea for a greater recognition of the kitchen garden, as an element in the scheme of the grounds and a place worth penetrating into for other purposes than to cut cabbages for the table, and therefore not to be entirely divorced and rendered inaccessible from the professedly ornamental grounds. A kitchen garden has a beauty of its own, different from that of the flower garden and lawn; not to speak of the pleasure, in its season, of eating fruit straight off the trees, which the author seems to pass over as frivolous. There is much sense too in his treatment of that architectural bugbear the conservatory, which, however pleasant a retreat it may be internally, spoils the exterior of many a fine house, hanging on it as a kind of parasite. It is gratifying to find that a writer who can speak with authority as a gardener is of opinion that the sheets of plate glass and the attenuated architectural features which characterise the ordinary modern conservatory are not even practically necessary. As he points out, a conservatory is really more for displaying plants than for growing them, and has to be more or less dependent upon the purely utilitarian supplementary plant houses, which need not be thrust into view. As long as the conservatory is accepted as a department of the dwelling house, and grouped with it, it should be designed to harmonise with it architecturally. Some architects, as we have had occasion to notice, have recently made a decided move in this direction; we hope others will follow their example.

We fear that the whole subject of "Planning for Landscape Effect," to which a separate chapter is devoted, is to our minds fraught with unreality and pretence, and it is only in fact in this chapter that the author seems to fall into some of the cant of the landscape gardener, though by no means to the extent that we have met with in books specially professing that unlawful art. Nor do we agree with the remark, in the chapter on "Forest Trees and Hedges," that the radiating avenue is "very rarely justified by results." We should be inclined to say that it is one of those devices which, when carried out on a large scale, cannot fail to produce a fine effect. Of course it must be remembered that an avenue is only in place at all when the condition and importance of the house are such that stateliness in its surroundings is natural and justifiable. An avenue leading up to a second-class house becomes a vulgarity.

Mr. Mawson's book contains a great amount of practical gardening information in regard to trees and shrubs, and the treatment of soil, &c., on which we have not touched, as we are considering the subject from the point of view of effect. But owners or prospective owners of estates to lay out will find the book of much practical value, and the generally sound views of the author in regard to the architectural treatment of gardens may be very useful, from the point of view of the architect, in the education of the client. Architects themselves may not learn much from the book, but they will be glad to welcome a gardener whose views on many points will be in harmony with their own. We may add that the illustrations to the book, drawn by Mr. Mallows "and others," are admirably done; and the volume generally is, in a decorative sense, worthy of its subject.

NOTES.

The Workmen's Compensation Act.

The recently-published Parliamentary Paper, containing statistics of the operation of the Workmen's Compensation Act, 1897, during the year 1899, will not add appreciably to the general information which is common knowledge in regard to the working of the Act. It is interesting, however, to note that the number of cases connected with building which came into court amount to 159, the total number of cases which were commenced being 1,347. Having regard to the large number of claims for accidents, the general impression to be gathered from these statistics is that litigation arising out of the statute is not so great as has been generally thought. As a matter of fact, the percentage of litigated cases to accidents is a little under 1 per cent. On the other hand, it is impossible to say whether this percentage is too large or too small, but certainly, had the Act been better drafted, the percentage would have been smaller. Out of the 999 cases finally settled by some species of judicial decision (for not every case which was begun by litigation was finished in that manner), 753 were decided in favour of the workman, and 246 for the employer. The practical moral to be drawn from this group of figures seems to be that generally speaking the employer had better pay than fight. Yet it has to be borne in mind that, in spite of the want of principle and form in the Act, some of the decisions in 1899 have settled the law, and, therefore, employers will not need in future to dispute so many cases in order to elucidate the meaning of the Act. As regards appeals, 4 per cent. of the cases which came before the lower Courts were appealed, being fifty-four taken to the English Court of Appeal. Of the twenty-three appeals by workmen five were successful; of the thirty-one by employers twelve were given in favour of the appellant. Here again the statistics do not give much encouragement to appellants. On the whole we are bound to say that, while we are still of opinion that the Act has given rise to much unnecessary litigation, we think there will be a good deal less of it in the future.

Technical Education.

We have received an interesting letter-pamphlet issued by the Technical Instruction Committee of the Corporation of Manchester, who are doing admirable work. It is by Mr. F. Brocklehurst, and gives some account of and some comments on Messrs. Ferranti's scholarship scheme. The object of it is to unite technical education with practical work. The firm offer a Day Scholarship at the Manchester Municipal Technical School to the apprentice who, not being more than nineteen years of age, obtains the highest position in the Science and Art examinations of any given year. Among other things, wages at the standard rate corresponding to his age will continue to be paid to the successful youth. Mr. Brocklehurst takes the opportunity of Messrs. Ferranti's scheme for some plain speaking on the apathy of a large number of employers in regard to the improvement of the education of the workman, both general and technical. One remark we would emphasise: Evening classes "are but of trifling value, because they come at the end of the day when body and brain are fatigued." This is quite true—evening classes are all very well as a kind of amusement or slight adjunct to manual labour; but they cannot take the place—as so many amiable persons in England seem to suppose—of a thorough, general, and technical educational course.

Arbitration in Light and Air Cases.

The lawyers seem to have some apprehension that the arbitration of architects in light and air cases may take the bread out of the mouth of the legal profession. The objections are put, of course, on public grounds but there seems a note of alarm in the following passage quoted from the *Law Times* of July 28:—

"If there is any truth in the rumour that architects wish to settle questions of light and air in new buildings by arbitration among themselves, their wish is hardly likely to have a very good reception from the public at large. The judge is in reality an arbitrator, though a completely independent one; but if an architect, however eminent, is to take his place, it will be very difficult to exclude the personal element. A is the architect of some new buildings which architect B says will interfere with the light and air of certain other buildings. They call in architect C. He may know one of the other architects, or know that one of them is a much more eminent man than the other. Then, human nature being what it is, a bias will spring up in his mind in favour of one or the other, or what, perhaps, is almost as bad, it will be believed to have done so. The very formality of a trial in court gives an impersonal character to the judge, and removes him from the dangers of feeling a professional bias in favour of one side or the other."

There is truth no doubt in the remark as to the essentially impersonal character of a trial in a court of law; but we think it will be quite possible to discover architect arbitrators who will be as impartial and "impersonal" as any judge, although they may not be hedged round by the paraphernalia of a court of law.

Newgate Prison and the Sessions House.

They who love Old London, together with those who can appreciate the expressive façade of the younger Dance's prison which

ell declares its austere and retributory ose, will be glad to learn that as many ossible of the stones are to be used in building of the new Sessions House and ral Criminal Courts. Begun in 1770, still incompleted when broken open and ed by the "No Popery" rioters in June, the existing gaol was erected in the y or ditch of the City wall, a portion of h yet remains along the east side of the age that leads to the Courts. The south, h, and west walls of the two wings, as from the street, are nearly four feet at their base, forming screens around two blocks of cells for the men's and the en's sides, which stand clear within, and erected in 1857 by J. B. Bunning, archi- to the Corporation. Along the east side, separated by the exercising grounds the chapel and the governor's house (in central block), is one block of the old ds wherein the prisoners crowded together ommon; the ward, disused for some e past, was the scene of Mrs. Fry's ane ministrations. The north wing, erly the "Debtors' Side," occupies part e site of the original prison that stood ss Newgate-street, in the gate of the wall. Turning down Old Bailey one es by the "Debtors' door" in front of h the pillory was placed and the fold used to be put together over night. the side of the door, which if opened ld admit one into the prison kitchen, is ot the staples to which the scaffold was ened. The large iron door adjacent in face of the wall was made for driving prison-van from the street into the tyard. The iron door was not used for long period, and the van is now driven the yard, erroneously identified with old Press yard, on the prison's south . The shed for execution of sentence nds near the north-east corner of the tral block, in the ground-floor of which the rooms wherein prisoners are seen their friends and legal advisers. Close the shed is a portion of the arched rway and part of the wall of one of the rds, their stones bearing manifest traces the fire to which they were exposed by rioters on June 6-7, 1780. The site the Surgeons' Hall, in Old Bailey, built 1745-6 by George Dance the elder, and led down in 1809, was taken for the largement by William Mountague, city hitect, of the Sessions House, which orge Dance, the younger, had rebuilt in 73-4. On the site of the Hall are offices the clerk of the peace, above the onnade of two rows of Doric pillars ected for witnesses in waiting. The ssions House was again enlarged, east- rds, by J. B. Bunning, and its interior was proved about fourteen years ago, at a cost 2,100*l*.

Sanitary State of Coleford, Gloucester.

JUDGING from Dr. Fletcher's Report to the Local Government Board upon an outbreak enteric fever last year in the Urban District of Coleford and the surrounding district West Dean, the sanitary state of the district appears to be in a very backward condition. This is the more discreditable to the District Council, seeing that in 1892 Dr. Fletcher inspected the Coleford district, and the sanitary condition of the district is today substantially the same as it was seven years ago, when Dr. Fletcher reported:—"Excrement disposal is mainly by means of privies with pits. Some of these privy pits admit surface water, others are covered in. But in general the pits are much too large and too deep, and they are often in a wet and filthy condition. The contents of the privies are emptied periodically by the occupiers of premises, and are disposed of upon gardens and fields. In some cases the privy accommodation is inadequate. There are also in the town a few pail-closets, and water-closets with flushing cisterns. In a few instances closets of the hopper description have been erected; but, as no water is laid on to them, they are dependent on hand flushing. Some were seen in a dirty state." The drainage and sewerage of Coleford, proceeds the Report, are highly unsatisfactory, and the polluted state of the water-courses in the town is dangerous to health. Nevertheless, not any of these conditions, singly or collectively, suffices to account for the occurrence of enteric fever cases spread over a wide area, and occurring in some instances at a distance from the insanitary conditions in question, and the cause of the fever is traced to the milk supply—either to the infection of milk cans by polluted water from a well, or through the agency of a milk-boy who suffered from a mild attack of fever. In concluding his Report Dr. Fletcher makes the following remarks, which it is to be hoped the District Council will act on:—"It must be said that the District Council have shown themselves incompetent and indifferent to their sanitary duties. Seven years ago the then Sanitary Authority were advised as to the action they should take to improve the sanitary condition of the town. They ignored the advice, and their successors, the District Council, have had a sharp lesson in the late epidemic of enteric fever. It remains for them to endeavour to meet the requirements of the town, and to take care that the numerous unwholesome conditions, which afford means of fostering the infection lately introduced, do not maintain the disease in the district in an endemic form."

The Banister Fletcher Bursary.

THIS newly-founded bursary has been awarded to Mr. Arthur Stratton, A.R.I.B.A., in open competition. As previously announced, the bursary has been founded in memory of the late Professor Banister Fletcher for the purpose of the promotion of the study of seventeenth and eighteenth century architecture in London by means of measured drawings, and for the preservation of records of buildings of historic and artistic interest which are likely to be destroyed or disfigured. Mr. Stratton, who was a pupil of the late A. E. Street, has made a special study of the work of this period, and especially of Sir C. Wren, and gained the Architectural Association Essay Medal for his life of Wren, since published. He has held the appointment of Demonstrator of Architecture at University College, Liverpool, since the formation of the department, a post which he has just resigned for the purpose of resuming practice in London.

Mural Tablets on Historic Houses, Bath.

IN continuation of the Bath Corporation's interesting scheme for placing mural tablets on historic houses, it has been arranged that on Thursday, September 20, Mr. Emerson, President of the Royal Institute of British Architects, shall unveil tablets to the elder and younger Wood, whose architectural works in Bath are well known. It is, we understand, expected that there will be quite an assembly of prominent architects on the occasion. The houses on which the tablets will be fixed are No. 24, Queen-square, the centre house on the north side, where John Wood the elder lived, and where he died on May 23, 1754; and No. 41, Gay-street, where John Wood the younger resided. The latter died in 1781 at his father's villa at Batheaston, near the church.

THE PARIS EXHIBITION:

NOTES ON MATERIALS OF CONSTRUCTION.

AN architect or engineer desirous of studying the various materials of construction in the Exhibition will not thank the Commissioners for adopting their present method of classifying the exhibits. In former exhibitions it has been the custom to classify the exhibits according to their country of origin, and whilst that method has several obvious drawbacks, very few people will find the mode now adopted a convenient one. The British Commissioners state that the classification of all products of a similar nature, whatever their origin, is preferable, as it enables both the student and the expert to appreciate the comparative merits of exhibits when industries of a similar nature are shown side by side. If that method of arrangement were adhered to, no doubt it would be a good one; but it is not, and in too many instances the result is chaos. In addition to showing in the French buildings, British exhibitors have erected separate buildings in various parts of the grounds, for the exclusive exhibition of their goods, and those from some other countries have followed suit. Add to this the Royal Pavilions, in which a miscellaneous assortment of exhibits in the various classes is shown! The muddle is accentuated by a peculiarity on the part of the French authorities which consists in employing a separate classification for colonies. As the British Commissioners remark, such a method applies more to countries in the preliminary stages of development, and they naïvely add, "British colonies and dependencies participating in the Exhibition are past this stage; they are producers and manufacturers of many articles which come under other classes of the classification, and, consequently, are entitled to rank with other nations in this respect." There can be no question as to the truth of this assertion, but this apparent conflict of the British with the French authorities only further intensifies the difficulty of pursuing the vicissitudes of materials of construction in the Exhibition.

Let us follow, say, the fortunes of building stones throughout the Exhibition. If "all products of a similar nature, whatever their origin," were classified accordingly, we ought to find building stones from all countries in close proximity to each other, and in the same building. Here, however, are the facts. Some building stones are classified under the heading of mining and metallurgy because the quarrying of building stones is now regarded by most countries as a mining operation, and because the study of them, from a scientific standpoint, may be included under mineralogy. This section will be found at one end of the Champ de Mars. A walk of about ¼ mile enables the visitor to see some more building stones in the department of civil engineering and transportation. Retracing his steps down the Champ de Mars, across the Pont d'Iena, he will arrive at the section devoted to India, where on a balcony on the first floor one of the best collections of building stones in the Exhibition will be found. Still following the marvellous classification adopted, he will pass from the India building to that erected by Canada, where there is an excellent exhibit of the building stones raised in the Dominion. To see the remainder of this class of materials the visitor may now proceed to the Esplanade des Invalides, about 1½ mile away, where they may be found in that part of the Exhibition known as "Decoration, Furniture, and Various Industries." On the way by the Royal Pavilions, he will see sundry slabs and blocks, some labelled and numbered, and some not.

Another point showing the distinct breakdown of the method of classification adopted may be exemplified by the inclusion of stone-dressing machines, under the heading of

mechanical engineering. Of course, there could be no objection to this in the abstract if it was not given out officially that "the raw material, processes of manufacture, and finished products of an industry" were to be included under one heading, and were to be exhibited alongside of each other. The official announcement is, "Machines will be shown in operation all over the Exhibition, those employed in certain manufactures being exhibited together with the raw and finished material in the groups to which they belong." After distributing the numerous building stones exhibited amongst divers sections and classes, the authorities probably found some difficulty in placing the building stone cutting and dressing machines near the "raw and finished material . . . to which they belong," and so placed them in a section which, so far as the classification adopted is concerned, can only be regarded as a refuge for the destitute.

Practically the same observations apply to other materials of construction. Timber may be found in the section devoted to forest, sport, fishing, and gathering wild crops, in the Indian pavilion; in the part devoted to education and instruction, in the Champ de Mars; in the Western Australian building; in the Ceylon section; and as a "finished material" in the "decoration, furniture, and various industries" section. The wood-working machinery, instead of being anywhere near the "raw and finished material," finds a home in the civil engineering group — though what such machinery (seeing that it consists largely of carving, moulding, planing, and mortising machines) has to do with civil engineering, it is not easy to see. Perhaps the best commentary we could make, in reference to the Parisian idea of classifying exhibits, is that the morning and evening daily papers shine forth under the heading of "Liberal Arts"—Or is that intended for sarcasm?

So far we have only alluded to the difficulties the visitor has in finding any sort of classification in regard to materials of construction; but a word or two may be said as to the great nuisance this method (or want of it) must entail on the makers of certain classes of goods, who are exhibitors. To deal no farther than with certain exhibitors of clay goods in the British sections: here we find some well known firms exhibiting. One firm, because it shows earthenware jars, mixing pans and bottles suitable for chemical purposes, finds these portions of its exhibits in the group of "Chemical Industries"; the same firm having other clay goods, such as baths, water-closet pans, and urinals, has been compelled to erect a special stand for their reception in the group relating to "Hygiene"; again, the same firm, desirous of showing its salt-glazed stoneware, china, and earthenware, has that portion of its clay goods relegated to the group of "Decoration and Furniture," nearly two miles away from the last-mentioned section; finally, the Royal Pavilion, having been open to receive this same firm's decoration of bath-room, tiles, sanitary fittings, &c., we find another part of its exhibits there. This must prove an intolerable nuisance, not only to that particular firm, but to many others placed in similar circumstances.

In the description of the various exhibits which follows, we have not adopted the official "method" of classification except in a limited way. We have preferred to follow that ideal but not as it is presented in practice. We shall place clay goods under one heading, timber and wood and machinery relating thereto under another, building and ornamental stones under a third, and so on; and we shall deal almost entirely with exhibits of British and colonial firms and Government departments.

The building stone exhibits, with which we will deal in this article, are, on the whole, somewhat disappointing. That may be accounted for, perhaps, in that so far as Great Britain is concerned, we have little to sell to the Continent in the way of building stones, whilst the Continent, on the contrary, sends a great deal to us. The cost of labour here practically prohibits the export of stone on a large scale, whilst the royalties demanded are far in excess of those, even in the form of a local tax, paid in any Continental country. The Continental seller (frequently an Englishman) pays nothing to the Custom House, whilst the British seller cannot land his stone on the Continent without being mulcted in taxes. Unless, therefore, the stone sent from this side is of some peculiar kind, such, for instance, as a good red granite (a rarity the world over), or a "black marble" which is really black (also difficult to procure), or good roofing slates, there is but little incentive to the British stone producer to exhibit on the Continent unless it be for honour and glory, or with a view to getting a medal or a mention for advertisement purposes. In any case, there can be little hope of his doing much business abroad, and the average stone firm is not in the habit of showing its products unless there is a likelihood of business resulting. On the other hand, we can well believe that some stone producers show at a place like the Paris Exhibition solely with the view to let the world see what they can do, as they are proud of their work.

Nevertheless, stones raised in this country for building, engineering, and surveyors' purposes are well represented in the exhibition, though after what we have said this last statement may seem paradoxical. The fact is, as very few British firms showed any signs of making a large exhibit, the Home Office took the matter in hand, and the result is a collective exhibit. If the stones look more like museum specimens than the produce of business firms, that cannot be wondered at, because, to our knowledge, the amount of money devoted to getting the series together was quite inadequate to obtain a better display. The fact that any money at all was devoted to any display, either in connexion with building stones or minerals, seems to indicate that at length the Home Office is becoming alive to the desirability of letting other nations know that they are not the only stone and other mineral producers. The Blue-books issued annually on the subject, which have a large circulation amongst Members of both Houses of Parliament, are rarely looked at by the public, and never by hon. Members, if we may judge from the ignorant questions frequently put in both Houses. It would have been interesting if the Home Office could have seen its way to have published a little book to accompany the Paris exhibit, giving a description of each sample shown and its uses. However, as we have before said, the Home Office exhibit, situated in the gallery of the Department of Mining and Metallurgy in the Champ de Mars, is distinctly good, and has the great merit of being of an educational value as distinguished from a mere advertisement.

We now propose to describe in some detail the stones shown, the more because whilst not being very numerous, they are good examples of the British production of that material and are largely representative. The collection also indicates that the Mining Department of the Home Office is now keenly alive as to the scope of building stone found in the country; before the passing of the Quarries Act, however, the Government inspectors had little opportunity of learning much about the stone industry, and it may be that we are indebted to that recent Act for this very exhibit, which is distinctly of practical value. It is to be hoped that when the specimens return to England they will be captured by some museum of architecture; such things, on the clearing out of a great exhibition, usually perish for want of looking after; but we believe that any influential representation to the Home Office could get them if for a public purpose and if not already promised. We merely throw this out as a hint.

The exhibit has been arranged under the supervision of Mr. W. W. Ware, Clerk of the Mineral Statistics Branch of the Home Office. It consists of statistics, &c., relating to British mining during the last quarter of a century: (1) diagrams showing for each year the number of persons employed above and below ground, the annual output of principal minerals wrought, and the death-rates from accidents; (2) maps showing the distribution of minerals; (3) reports of mining inspectors; (4) a selection of miners' safety lamps; and (5) specimens of the various minerals wrought in the United Kingdom. As showing what the Home Office authorities believe to be representative, we give the following; the description attached to each stone mentioned is our own:—

1. Portland stone; a cream coloured oolite (it is not stated whether the sample came from the base bed or whit bed).

2. Preshope quarry, Salop; a grey limestone, probably from the Carboniferous series.

3. Bath stone, Box Ground, and Monk's Park varieties; cream coloured oolite.

4. Hopton Wood stone, Derbyshire; a Carboniferous limestone. The following varieties, some of which are used as marbles, are shown:—(*a*) Light Hopton, a very fine-grained stone of light yellowish brown tint, chiefly composed of the débris of crinoids; (*b*) yellow Hopton, similar to last, but rather coarser in grain; (*c*) bird's eye marble; this stone is of two varieties in the quarries, one known as black bird's eye and the other as grey; it is mainly composed of disjointed segments of crinoid stems; (*d*) brown marble, coarser in grain, but of similar origin; and (*e*) crinoid coarse marble, in which large crinoid fragments cut at various angles and giving a great variety of pattern, are set in smaller débris of the same.

5. Devonshire marble from East Ramsdon quarry; of Devonian age; of a red colour veined white and pink. Several specimens from Petton which take an excellent polish; and dark coral and red marble, from Stawell's Bushes quarry.

Turning to the sandstones we find—

6. Cream brown sandstone from the Bridge and Cureton quarry, Salop.

7. Fine-grained, dark red sandstone from St. Bee's Head Quarry, Cumberland.

8. Light grey sandstone from Hollington Quarry, Staffs.

Amongst igneous rocks the following are represented:—

9. Cornish granites from Carnsew, Lamorna, and other localities; chiefly schorlaceous granites of grey tint, speckled black, and varying in grain from medium to coarse, some being of a well-marked porphyritic character.

10. Peterhead granite; a hornblendic granite of red tint, characterised by the abundance of smoky quartz.

11. Newry granite, Ireland; a grey rock of dioritic character and fine-grained.

12. Mountsorrel granite, polished, a red variety. (This, however, is not extensively used in the arts in a polished state, the well-known Mountsorrel stone being principally employed for surveyors' purposes.)

13. Donegal granite from Dungloe quarry; a red granite of medium-coarse grain with small proportions of hornblende.

14. Kirkcudbright granite from Craignair quarry.

15. Diorite of very fine grain from Penmaenmawr, North Wales.

16. Luxullianite, from Luxullyan, Cornwall; a coarse-grained red rock, chiefly composed of schorl and orthoclase felspar, with a little quartz. (This rock ought not to have been shown in a representative series of stones useful in the arts; it has never been found, except in one limited instance, *in situ*, and its principal claim to notoriety, outside its petrological interest, is that a boulder of it was employed in the manufacture of the sarcophagus which contains the body of the famous Duke of Wellington.)

17. Porphyry, of a red tint, with phenocrysts of orthoclase felspar. (We have never seen this rock used in the arts, though from its striking appearance it has found its way into collections, and it may be used locally as a road metal.)

18. Felsite from the Askham quarries.

19. Syenite from Stoney Stanton, Leicestershire; a fine-grained rock of red tint, principally composed of orthoclase felspar and hornblende.

20. Welsh syenite, Eifl quarries, North Wales; fine grained, and in three varieties, grey and pink tints being represented.

21. Felsite, Threlkeld quarries, Keswick, Cumberland; the stone is fine grained and of a grey tint.

22. Basalt from Clee Hill; a black rock of fine grain, with small acicular crystals of plagioclase felspar, largely used as a road metal.

23. Basalt, from Barrasford, Northumberland.

24. Porphyritic granite, Shap, Westmoreland; both light and dark red varieties are represented. This rock is characterised by the presence of large phenocrysts of orthoclase felspar and of the mineral sphene; small crystals of hornblende are also present.

25. Serpentine from the Lizard, Cornwall; the red variety.

26. Serpentine from Lissoughter quarry, Galway; a green rock, probably an ophicalcite.

Typical examples of slates are shown:—

27. Welsh slate from Dorothea Slate quarry, Carnarvon, in three varieties—(*a*) reddish purple, (*b*) purple, and (*c*) blue; also the well-known slate from Blaenau, Festiniog.

28. Lake District slates from Coniston, near Ambleside, of a deep olive-green tint; from Elterwater of a light sea-green tint; and from Buttermere of a green tint.

29. Scotch slate from Aberfoyle, Perthshire; dark blue and green slates.

30. Irish slate from Killaloe, county Tipperary.

Looking down this list it is evident that much care has been bestowed on the selection of the specimens; nevertheless, it might have been somewhat enlarged to advantage. Amongst the limestones, there are both hard and soft varieties, used for ashlar and as marbles, including oolites and shelly limestones. The sandstones, however, have not received the attention they deserve,* inasmuch as none of the Yorkshire stones are represented.

* At the time of our visit some two or three labels had fallen from the stones to which they referred, and were hidden from view, and one certainly referred to a sandstone. Our list is incomplete to that extent.

or any from Scotland. The principal absentee, so far as we were able to see, from the igneous rocks is the well-known Aberdeen grey granite (though Aberdeen granites are represented in other exhibits, as will presently be seen). The slates are representative.

In the same section of Mining and Metallurgy there is a special exhibit by Messrs. Garden & Co., of Aberdeen, consisting of worked red granite, raised not far from the "granite city." There is a large and ornate carved and sculptured tomb, polished in parts, the carvings standing in high relief, and these latter are not polished—altogether a representative exhibit of the kind of work turned out from the best masonry establishments in Aberdeen. There is one part of this exhibit, however, which seems to be somewhat out of place, and this consists of several specimens of granites, augite syenites, &c., polished in small samples, and mounted together in a frame hanging on the wall. The majority of these samples are of foreign origin apparently, for we seemed to recognise some well-known Scandinavian stones which are largely imported into Aberdeen, though we could see no labels on them. If the British Commissioners know anything about building and ornamental stones they should certainly have seen that what is exhibited in a British section is of British origin.

Messrs. Robert Patterson & Son, of Newcastle-on-Tyne, have a number of their grindstones and millstones in graduated sizes on view in the same section. They are of a grey tint, range from 48 in. up to 6 in. in diameter, and are manufactured from the solid rock. Messrs. Pease & Partners, Limited, of Darlington, amongst other things show some Frosterly marble, which takes a good polish, and has a black ground with grey sections of the coral *Cyathophyllum*.. To see how beautifully the Parisian method of classification works in practice, it may be noted that if this firm's exhibit had been classified according to the method theoretically adopted, one part of it—the marble—ought to be under "Decoration"; another—the by-products obtained in the manufacture of coke, ought to be placed in the group of "Chemical Industries"; and a third portion—building bricks—might be placed under "Civil Engineering, Decoration, or Various Industries," whilst a fourth—coke and coal—rightly finds a home where it is, under "Mining."

(*To be continued.*)

THE BRITISH ARCHÆOLOGICAL ASSOCIATION AT LEICESTER.

THE following is the conclusion of our account of the proceedings at Leicester of the annual Congress of the British Archæological Association :—

Thursday, August 2.

This day was devoted entirely to viewing the objects of interest in Leicester itself, under the guidance of the hon. secs. of the Leicestershire Architectural and Archæological Society. Leaving the hotel at 10 o'clock the members and visitors proceeded first to St. Margaret's Church. Its history and description were given by the Vicar, the Rev. Canon Rendell. The church stands outside the walls of the town at its south-eastern angle, upon the very spot occupied by the primitive cathedral of Leicester when Leicester was a city and a bishopric, and the site is still called the Bishop's Fee. No traces of the church of the eighth century remain; the oldest portion of the present edifice is of about the year 1200. The fine, well-proportioned tower is of the middle of the fifteenth century, as is also the south porch, with chamber over it, which are said to have been built out of the proceeds of the "smoke farthing," a tax levied by the authority of the Bishop of Lincoln. Within the chancel rails is the fine tomb and effigy of Bishop Penney, who was sometime Abbot of Leicester, but was promoted to the Bishopric of Bangor in 1508. He died and was buried in the Abbey in 1520, but at the suppression his remains and tomb were removed to St. Margaret's, the mother church of the town. There is a good Perpendicular sedilia and piscina in this church and some nice old painted glass in the south-west window of the south aisle, probably Flemish.

All Saints' Church was next visited. It is a small edifice, dating from 1199, when it was founded by Earl Robert, "le bossu." The font is very elegant and richly carved of thirteenth century date. In many particulars this church is still in an unrestored condition. In the square pews there is worked up much old carved panelling, all, however, painted and grained. There is a curious external clock with figures which strike the hours with hammers; this has recently been restored, painted and gilt, and set up over the south entrance close to the street. A visit was next paid to the old Grammar School, now a carpet warehouse. It was built out of the materials of the demolished Church of St. Peter taken down in 1573. Queen Elizabeth, by a deed of grant in that year, sanctioned, as head of the Duchy of Lancaster, the sale of the materials of the old church for the sum of 35*l*. A very interesting collection of antiquities, made by Mr. Spurway, was laid out specially for the inspection of the members of the Congress, and amongst them was a wool weight of the time of Elizabeth. All these antiquities were discovered in Leicester, and will eventually, no doubt, be transferred to the museum.

St. Nicholas Church was the next item on the programme, and it was described by Mr. Lynam, F.S.A., hon. treasurer of the Association. This church is the most ancient in Leicester, and stands upon the site of a Roman temple. Roman materials are abundantly used in its construction. The church is particularly interesting because of the very early nature of some of its features. The small, semicircular upper windows in the north wall of the nave, with double arches formed of Roman brick and tile, have all the appearance of Saxon work, although the nave arches beneath them are Early Norman. The central tower is also Norman, of coarse ashlar, having a blind arcade of five arches on each of the four sides of the interior in its upper stage. The chancel is Early English, and the south doorway of a date between the tower and chancel. There are no monuments nor any remains of old glass. On the east wall over the chancel arch the lines of the original roof are visible.

Leaving St. Nicholas Church a passing glance was given to the remains of the Old Jewry wall adjoining, and then the party inspected the recently-discovered Roman pavement, now so well preserved, well lighted, and accessible in the basement of newly-built premises just opposite. Proceeding on their perambulation the members next had their attention directed to the old Chantry House in the Newarke, which was built about 1510 by Wm. Wyggeston as a residence for two priests attached to the Collegiate Church in the Newarke. The house is very picturesque, covered with ivy, and is distinguished by the Wyggeston arms over the entrance. The church was demolished after the Reformation. In the old Town Hall, next visited, Shakspeare is said to have performed. The hooks and pulleys to which the curtains were suspended when the hall was used as a theatre still remain in the old tie-beams of the roof. The building appears to belong to the time of Henry VII., and it has a fine open timber roof. The Mayor's parlour adjoining is a very quaint old chamber, with a fine carved mantel-piece and Mayor's seat, both dated 1637. There are also some nice pieces of old glass in the long, narrow, many-mullioned windows. The hall belonged originally to the Guild of Corpus Christi. St. Martin's Church was next visited, where the vicar, the Rev. Canon Sanders, gave a full account of its history. The church is a large one of ancient foundation, but has in great part been rebuilt; for many years it was in the hands of the late Mr. David Brandon. The south aisle, of the date of 1350, belonged to the Guild of Corpus Christi. The Guild of St. George also had a chapel in this church at the west end of the south aisle. Over its altar used to be an equestrian figure of St. George, which was carried in procession on the festival day, and there is an entry in the churchwardens' accounts for 1540 of its sale by them. These accounts are perfect and complete from the Reformation. In this churchyard, as in several others in Leicester, there are many gravestones of slate, with, in many instances, very artistic designs in incised ornament, sometimes coloured and gilt. There appears to have been a school of artists in slate who did this work even as late as 1830. After luncheon at the hotel, the programme was continued, and a visit paid to the newly discovered Roman pavement beneath the Great Central Station. This is a magnificent specimen of most elaborate ornamental patterns, one of the richest ever discovered, and was greatly admired. The members, however, regretted to find that, notwithstanding the costly nature of the works carried out by the railway company in order to preserve it and give adequate daylight and ample facilities of approach for the public to examine the pavement, something more requires to be done to keep water and dampness from continuing to injure the work, and the members of the Congress passed a resolution, to be forwarded to the company and the authorities concerned, expressing the hope that such steps would be taken without further delay. St. Mary's Church was then visited, and was admirably described by Colonel Bellairs. It was originally the chapel of the Castle of Leicester, and was founded by Ethelfleda, the Lady of Mercia, but nothing now remains of the Saxon Church. The oldest architectural portions of the church are to be seen at the west end, where there is a low mural arcade of Norman work and an upper story of the same date. The church originally was without aisles and had a low central tower. That was as it was built by Robert de Bellemont, about 1107, and situated as usual in the outer ward of the Castle. Some years afterwards he made the church a collegiate church for a dean and canons. The present north door would be the main entrance from the outer ward, and was the outer door of a porch which seemingly had a room over it lighted by the small Norman window over the doorway. This doorway is richly decorated with zigzag ornament. The double doors themselves are very richly carved with panelling of Perpendicular date. There appears to have been very great care taken that no entrance should be made to this church from the inner ward of the Castle or Castle yard, not even a window looked that way below the level of the belfry windows of the tower. The south aisle, tower, and spire are said to have been the work of John of Gaunt. At about the same period the Parish Church of St. Mary was added to the Castle Church on the south side and absorbed the south aisle of the Castle Church from which it was separated by a wooden screen, a small part of which still remains at the east end of the south arcade. About the latter end of the fifteenth century the Parish Church was widened to its present extent and the beautiful roof added, and the exclusiveness of the inner ward of the Castle, which was then in a very dilapidated condition, was to some extent broken through. There is a very elaborate and nearly unique Norman sedilia and piscina in the chancel of the collegiate church. This church is one ot the most interesting in Leicester owing to its connexion with the Castle. A move was now made to the Castle, the Norman hall of which, now encased outwardly with brickwork, is used as the Assize Courts, and thence to the hospital or Bede House of the Holy Trinity, founded and largely endowed by Henry, Earl of Lancaster, in 1331. Here the visitors saw the huge so-called porridge-pot, date 1331, which was used for cooking the food of the Hospitallers. In the chancel of the hospital chapel is an effigy of the widow of the first Earl of Lancaster. The history of the hospital was given by Col. Bellairs. This visit concluded the day's perambulations. At the evening meeting in the large room of the hotel, Major W. J. Freer, V.D., hon sec. of the Leicester Society, presiding, Mr. I. C. Gould read a very useful and carefully prepared paper on "Early Fortifications," dealing mainly with the earthwork forts which abound throughout the land, but which have not been studied until recently with the importance the subject demands. He traced the various forms of fortifications still existing and compared them with others of similar character in other countries, and illustrated his paper by many excellent plans and diagrams. Dr. Brushfield, F.S.A., contributed a paper upon a subject of local interest—"A Leicester Church Brief" of 1640, and dealt with the question of church briefs generally.

Friday, August 3.

This day, being fixed for the annual meeting of the Leicestershire Architectural and Archæological Society, a united excursion of that Society and the British Archæological Association was arranged, under the guidance of Mr. Thomas Harrold, of the former Society. The two bodies in a large party left the hotel in carriages about ten o'clock, and drove first to Newbold Verdon Manor House. The house was built about 1680, but there is evidence in

the masonry of an older building. The house possesses a fine oak staircase and some oak panelled rooms, but the effect is marred by the whole of the woodwork having been painted a dark-brown colour.

There are the remains of what must have been a fine double avenue of yew trees. Market Bosworth was soon reached, and the members visited the grammar school, in which Dr. Johnson was for some time an usher. Then the fine church was inspected, dating, in part, from the thirteenth century. The chancel walls are of rubble, the aisles of ashlar; they date from the fifteenth century. There is a good Perpendicular east window, with canopied niches on either side, and a hagioscope in the wall from south aisle to chancel. The church possesses a very substantial, but plain, old oak chest, probably of the fifteenth century. The registers date from 1568. The font is very elegant, of early fourteenth-century date upon an earlier base. The tower is vaulted and groined, and of the Decorated period. After lunching at Market Bosworth the members departed for the field of the famous battle which decided the long wars of the Roses. They ascended the mound from which King Richard III. addressed his troops on that fateful day, and listened to Mr. Harrold's description of the battle and the disposition of the opposing forces. They saw the well from which it is said that the king and his charger drank before the last charge in which he fell. Greatly changed must be the aspect of the land since the battle; then it was all open rolling plain, now it is divided into fields by hedgerows, and a railway station covers the spot on which the king's body was found. A passing call was made at Dadlington, in the churchyard of which it is said many a brave soldier killed at Bosworth Field found a grave. The church is small but very interesting. Before restoration it possessed a shingled spire, almost unique, it is said, in Leicestershire. The old oak door, much weatherworn, is now preserved in the vestry at the west end.

Stoke Golding, the last church to be visited, is a fine fourteenth-century building. It has not been much touched by restoration. It has richly-moulded clustered piers, with fine capitals of beautifully-carved foliage in which the marguerite is introduced, the church being dedicated to St. Margaret. It is a double-aisled church, of very good proportions. A massive oak and iron bound chest, lettered a "Stocke Cheste," and dated 1636, with the initial letters of the churchwardens carved upon it, is preserved in the south aisle. Leicester was reached about 7.30, the only day on which the times given in the programmes had been exceeded; but the ground covered was considerably over thirty miles, and the weather wet and dreary. The evening meeting was held in the large room of the hotel, under the presidency of the Rural Dean, the Rev. Canon Rendell. Mr. Thomas Blashill gave a short account of the "Origin of the Frame Work Knitters' Company," one of the City companies. The company received its first charter in 1657 from the Protector Cromwell, and its present charter dates from the Restoration. The company had authority over all workmen engaged with the stocking frame and over all machine-knitted fabrics, the great development of which in Leicester made the subject appropriate at this congress. The company could search out and destroy all bad work, prevent the exportation of machinery, and regulate apprenticeship. These functions it continued to exercise until early in this century, when all like powers and duties of the old companies came to an end. Mr. W. T. Rowlett, a member of the Framework Knitters' Company, explained, by means of plans and diagrams, the various processes, both ancient and modern, used in the manufacture of stockings and other knitted fabrics. A paper was then read, in the absence of the author, by Mr. Patrick, hon. secretary, on "Wickliff and his Times," by the Rev. W. S. Lach-Szyrma, M.A., in view of the proposed visit to Lutterworth the next day. Mr. Lach-Szyrma recommended the study of Chaucer, Piers Ploughman, and, above all, of Wickliff, to all who wished to understand something of the social life of England in one of the most attractive periods of English history, viz., the age between Cressy and Agincourt, *i.e.*, the era of Edward III., Richard II., and Henry IV. and V. These three writers he considered to be the most trustworthy guides.

Saturday, August 4.

The weather was fine and bright after the recent rain, and a goodly number of the members left at 9.50 by the Great Central Railway for Lutterworth, of which parish the celebrated Wickliff was rector from 1375 to 1384. Mr. Patrick, hon. sec., read a paper on the "History of Lutterworth and its Rector," and described the church. Lutterworth is mentioned in "Domesday Book," but there is no record of a church there in Saxon or early Norman times. The present building, in its oldest part, dates from the thirteenth century. It consists of a nave, aisles, chancel, and massive tower at the west end. The tower, up to the middle stage, and the chancel and north aisle are the earliest parts. The rest of the church is of the early Decorated and Perpendicular periods. The rood loft was approached from the interior of the church, and a large semicircular recess on the south side of the chancel arch indicates the position of the stairs. This church affords good examples of the various forms of window tracery, some of which are illustrated in the text-books of Freeman and others. Some interesting examples of mural decoration of the fourteenth and fifteenth centuries are still preserved here. One, over the north door, consisting of three full-sized figures, two kings, with a lady between them, carrying hawks on their wrists, was considered by the late Mr. Bloxam to represent Edward II. and Edward III., but he did not account for the lady. Other interpretations have been suggested, but none are sufficiently conclusive. They may, perhaps, commemorate Richard II. and his Queen, Anne of Bohemia, and John of Gaunt, Duke of Lancaster, who claimed to be King of Castile. The wall above the chancel arch is covered with a large painting of the Doom or Last Judgment, probably not earlier than the fifteenth century.

In this church the great reformer John Wickliff ministered and worshipped for some years, and it was whilst engaged in the sacred office of the Eucharist that he was seized with his last illness and died December 28, 1384. He was buried in the chancel, and his body rested there for forty-four years, when, in fulfilment of the decree of the Council of Constance, his remains were disinterred, burnt, and cast into the river Swift. There is an interesting piece of embroidery preserved in a glass case in the vestry which appears to belong to the fourteenth century, and may have formed a part, as is said, of a vestment worn by Wickliff, but it is uncertain, and the other relics said to be associated with him—the chair in the chancel and the fine carved oak table in the nave, are several centuries later in date; the table particularly is Jacobean and a fine example. Mr. Andrew Oliver gave a careful description of the Fielding monument in this church, which is an altar tomb with two recumbent effigies of a knight and lady in alabaster. Upon the floor close by are two brasses, said to represent the same individuals. Mr. Oliver, however, drew attention to the differences in the costume of the figures, and said they could not be intended for the same persons, although members of the same family of Fielding, and that there was an interval of at least seventy years between them. After strolling about the little town the party returned to Leicester in time for luncheon and the closing meeting of the Congress at the Museum Buildings at 3.30. Mr. Lynam, hon. treasurer, took the chair, and the usual votes of thanks to the local authorities and all who had contributed by work or papers to make the Congress successful were passed, and the members separated.

Information Office, Paris Exhibition.—The Royal Commission at the Paris Exhibition has instituted a Commercial Information Office for the use, without charge, of British exhibitors, visitors, and members of congresses. They have at the disposal of English members, who may be attending congresses, a spacious room where they can meet and discuss. This office is situated on the Quai D'Orsay; entrance by the side door on the east. A writing-room is provided for the use of members of congresses, and information on trade matters will be given as far as possible. In the office will also be found a comprehensive set of Customs tariffs, information as to transport by land and sea, books of reference, directories, &c. Letters and telegrams can also, during the congress, be addressed to members, as follows:—Telegrams, care of "Britpav," Paris; letters, care of Commercial Information Office, British Royal Pavilion, Quai D'Orsay. The office will be open daily from 10 a.m. to 5 p.m.

BUILDING TRADES' GIFT TO THE NATION:

HOMES FOR DISCHARGED SOLDIERS.

We are informed that, whilst rapid progress is being made with the erection of the Homes for Discharged Soldiers at Bisley, it has been found that they are still short of certain building materials, so that further gifts in kind are now again invited. The gifts which would be most welcome are the following, and any communications or offers regarding these gifts, dimensions, and the like, should be addressed to the Executive of the Building Trades' Gift, No. 1, Waterloo-place, Pall Mall, S.W.:—

Bricks.—30,000 red facing bricks (in two batches of 15,000).

Cement and Lime.—100 tons of Portland cement; 100 yards of lime.

Terra Cotta.—400 ft. (run) coping, 9 in. by 6 in.; 200 ft. (run), sills, 10 in. by 6 in.; 100 ft. (run) coping, 2 in. by 5 in.

Stonework.—400 ft. (run) coping, 9 in. by 6 in.; 200 ft. (run) sills, 10 in. by 6 in.; 100 ft. (run) coping, 2 in. by 5 in.

Carpenter.—10,000 ft. (run) 2-in. by 4-in. rafters and ceiling-joists; 3,500 ft. (run) 2-in. by 9-in floor-joists (average 15-ft. lengths); 5,000 ft. (run) 2-in. by 5½-in. floor-joists in short lengths; 1,000 ft. (run) 9-in. by 3-in. timber for trusses (various lengths).

Joiner.—2,000 ft. (run) 10-in. or 12-in. moulded skirting; 2,000 squares, 1 in. thick, best yellow flooring.

Doors.—Seventy-five four-panelled doors, moulded both sides to detail, average size 6 ft. 6 in. to 2 ft. 6 in., with lining complete; 2,000 ft. (run) 1-in. by 4½-in. architraves.

Casements and Frames.—Twenty-four large windows, frames fitted with three casements and three fanlights, complete off the bench; twenty-four small windows, frames fitted with two casements, complete off the bench.

Lead.—25 cwt. 4-in. lead soil pipe; 200 lb. solder; 10 cwt. lead pipe for water supply; 500 ft. run ¾-in. steam barrel.

Sheet Lead.—10 tons 5-lb. sheet lead for roof work.

Zinc Sheeting.—1,500 ft. 14 gauge zinc.

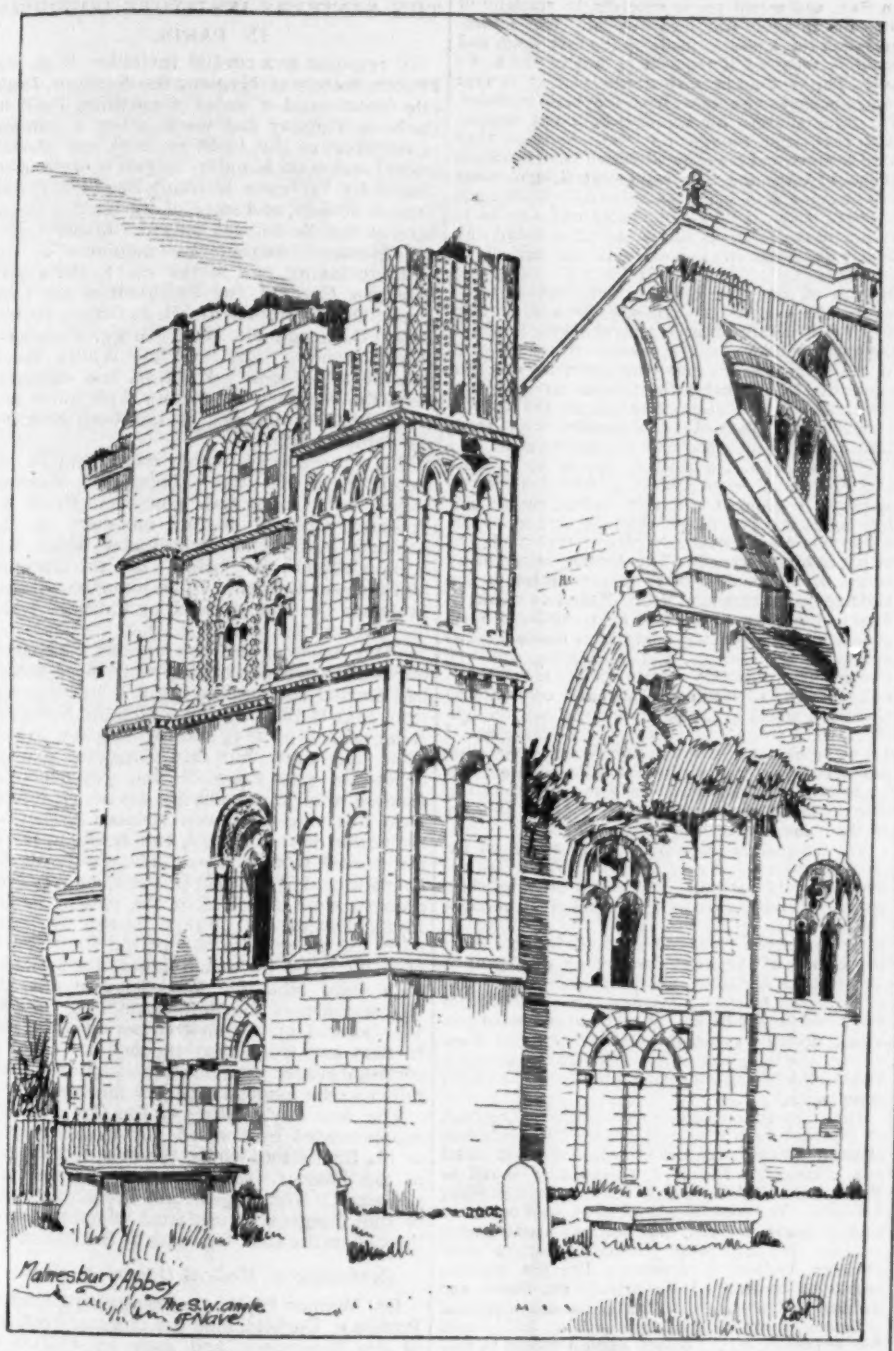
Rain-water Pipes.—1,500 ft. 5-in. by 3-in guttering, 500 ft. run 4-in. round or square rain-water pipes.

CRYSTAL PALACE SCHOOL OF PRACTICAL ENGINEERING.

Mr. A. T. Walmisley presided on Thursday last week at the award of certificates to students of the School of Practical Engineering at the Crystal Palace. Mr. W. Gardiner, secretary to the Crystal Palace Company, read the list of awards and the reports from the examiners, two of whom were former students.

Referring to the future of the school, Mr. Walmisley said that it had long been a cherished idea on the part of the directors to give this school the opportunity of becoming the leading school for engineering training in the country; but more space was needed and more plant to work with. He hoped the directors would at an early date be in the position to consider spending further sums upon the development of the school, and he felt sure that their efforts would be appreciated in the profession. Those who had inspected the students' work on this occasion must feel that it was satisfactory to themselves, as well as to the teaching and governing body.

It was half the battle in life to choose one's calling rightly, and here students had the advantage of seeing whether they had done so before proceeding further. Many young men imagined that, if they could construct a boat or a model of an engine, they were born engineers, but they soon found out that more than the "cunning" of the hand was needed, and that it was a study involving the "cunning" of the brain. The engineer must be more than a man of method and routine. He must be a man of reflection. He (the speaker) was glad to see evidence of mental resource in the exhibits he had inspected, because no profession needed training of the mind more than that of a civil engineer. He should be no mere copyist, but possess inventive fertility in order to deal with new and difficult cases. Nature, calm and unrelenting, always stood looking at his work, and if he did not understand how to direct the vast resources of Nature, with which he dealt, to the use and convenience of man, they would soon reward his interference by directing him to shut up shop. The days were past when the engineer could be a rule-of-thumb practitioner—one who carried a pair of brass compasses in his pocket



and plenty of "brass" in his face. He must be able nowadays to state reasons for his assertions if he wished to maintain the confidence of his clients. The main object of understanding the calculation of the theory of stresses in girders and similar structures was not to be able to cut down the sections to a minimum, but to be able to avoid putting excess of metal in wrong places, and to know that the structure was uniformly strong. They had to consider the endurance of the material. The late Sir John Hawkshaw was once asked if he had not made a certain beam stronger than theory demanded. "Yes, I have," he replied, and added, "I used to be stronger than I am now, so I have made that beam to be able to take its work when it is as old as I am." Herein was the difference between the use of so-called "factors of safety" and such factors of ignorance as were the result of groupings in the vague atmosphere of empiricism. They understood the composition of their formula and knew how to apply it reliably. Without this the formula was purely conventional. In this school they had the advantage of learning the theory in a practical way. They were shown what book work to read carefully and what pages might be skimmed over, and this oral tuition was certainly more fruitful than solitary reading, while the workshop and laboratory practice furnished treatment based upon real knowledge and prepared them to profit by the subsequent experience which might offer in actual work.

Mr. J. W. Wilson, the principal, gave a short address, and Mr. H. E. Milner, one of the directors, proposed a vote of thanks to Mr. Walmisley, which was accorded with acclamation.

The next term commences on September 10.

MALMESBURY ABBEY.

THE sketch shows the south-west angle of the nave of Malmesbury Abbey Church, referred to in one of our "Notes" last week as being included in the scheme of restoration. The fragment of the Norman west doorway shows on the extreme left with the jamb of the Perpendicular window above it. The south aisle has later tracery inserted in the Norman windows, and the clearstory was rebuilt in the fourteenth century. The western tower (Malmesbury resembled Hereford in having western and central towers) probably stood over the first two bays of the nave, now ruined. The double flying buttress to support the south-east angle of the tower shows on the right of the sketch and the angle of the south porch.

COMPETITIONS.

IMPROVEMENTS, EAST BAY, DUNOON.—The awards of 100*l.*, 50*l.*, and 25*l.* respectively for the best plan of improvements in the East Bay, Dunoon, have been announced. First, Messrs. Wardlow & Millar, C.E., 109, Bath-street, Glasgow; second, Mr. James More, jun., 13, Drummond-place, Edinburgh; and the third was divided between Mr. C. J. M. Mackintosh, C.E., Burgh Surveyor, Dunoon, and Messrs. Wylie & Blake, C.E., 134, St. Vincent-street, Glasgow. The plans, twenty-three in number, are to be on view to the public on the 24th and 25th in the Burgh Hall.

WORKMEN'S DWELLINGS, BRADFORD.

THE problem of the suitable housing of the working classes is one of the most serious now before the local governing bodies of this country. At the meeting on the 8th inst. the Building Committee approved of plans and ordered them to be lithographed in order that builders and others who may be disposed to invest their money in such an undertaking may know the class of accommodation that is needed and the style of house that must be built in order to satisfy the requirements of the Local Authority. In consequence of the undertaking given to Parliament when the boundaries of the city were last extended, back-to-back houses cannot be built in Bradford. The problem therefore is to build through houses to comply with the by-laws, and at such a prime cost that the rental charged will be within the means of those by whom such accommodation is most needed. In the plans approved—which were submitted by Mr. Michael O'Flynn, Bradford—an apparently very successful attempt has been made to combine the maximum of convenience with the minimum of cost, and by this standard the plans must be judged. It would of course be a very simple matter to make improvements in the plans, but at the same time the cost would be increased. The plans provide all the essentials of a comfortable sanitary home for a working man and his family. On the ground floor there is a living-room 15 ft. by 14 ft. 6 in. fitted with a kitchen range with two large cupboards. Behind the living-room is a scullery with a depth of about 7 ft., and fitted with a set-pan, a sink, and an earthenware bath with a movable table over it. Under the stairs is a pantry. The first floor, reached by convenient stairs, contains a large front bedroom—14 ft. 6 in. by 11 ft.—a small bedroom at the back, and a clothes closet. Above is an attic, 15 ft. square, forming another large bedroom. At the back of the house there is a court-yard having an area of 180 square feet, and opening on to a back road. In the courtyard are coal-store, water-closet, and ash-bin. The outside walls will be built of stone, lined with brick, and the parting walls will be of 9-in. brickwork. The living-room is a comparatively large apartment. It is intended that it shall be in truth a "living-room," the practice of setting aside the front room as a parlour, more or less for show purposes, and living in a dull, stuffy back kitchen, being one that it is not desirable to encourage in small houses. There is also no cellar, partly on account of the extra cost and partly because cellars are apt to be used as living-rooms though they are utterly unfitted for such a purpose. The arrangement of the scullery, though cheap in cost, is yet very convenient. The bath—which when not in use will be covered by a table—will have cold water laid on, but not hot water, the fittings for which would be too expensive. The set-pan, however, is at hand, and will provide hot water for baths. In the whole of the house no space will lie idle. Every corner has its use, but at the same time the accommodation is on a more liberal scale than in the majority of Bradford cottages. Ventilation has been especially considered, and in addition to the window a ventilator will be placed in the wall of the back bedroom. The through construction of the house also ensures under ordinary conditions a free current of air from back to front. The most important point of all is the cost. Calculating the cost of land at 5*s.* per square yard, the total estimated cost is 225*l.*, including the cost of paving streets and the purchase of the land. The land and building by themselves have been variously estimated to cost from 207*l.* to 211*l.* 10*s.* This is very little more than back-to-back houses affording the same accommodation could be built for. In arriving at the estimated cost it has been assumed that the houses would be built in blocks of not less than twelve. Assuming the actual cost to work out near to these estimates, the houses could be let at 5*s.* 6*d.* per week each, including rates. Let at 6*s.* per week, including the rates now levied in Bradford, such houses should show a return to the investor of about 5 per cent., and they would certainly not be likely to stand long empty. In a short time lithographed copies of the plans will be obtainable on application to the City Surveyor.—*Bradford Observer.*

THE GRECIAN THEATRE AND EAGLE TAVERN.—The site of the Eagle tavern, and that of the Grecian theatre in the rear, are now being cleared for, we gather, the erection of a police-station. The tavern was erected on the site of the old Shepherd and Shepherdess tea-gardens, near Wenlock Barn. The Grecian theatre with its gardens and grottoes, formed a highly popular place of entertainment some thirty or forty years ago; it was built by Thomas Rouse, and had latterly been used for purposes of the "Salvation Army."

Illustrations.

ENTRANCE HALL, EASTERN TELEGRAPH COMPANY'S NEW OFFICES.

THE entrance hall of the new offices of the Eastern Telegraph Company forms an important feature in the new building. In the archway is a light screen in which are bronze and glass swing doors, the arch opening being entirely glazed. The barrel roof of the hall is a continuation of the arch.

The walls are to be carried out in Bath stone, and a frieze has been designed to represent the extensive work done by the company.

Beyond this hall are the grand staircase and the lifts to the upper stories.

Mr. John Belcher, A.R.A., is the architect. We illustrated the Finsbury-pavement elevation of the building in our issue for May 26.

LIVERPOOL DOCK OFFICES COMPETITION:

THIRD PREMIATED DESIGN.

WE give this week the perspective view and plans of the third premiated design in the Liverpool Dock Offices competition, by Mr. J. H. Cook. The following extracts from the architect's report, sent with the drawings, serve to explain the intention of the design:—

"The shape of the site is a somewhat unusual one, and calls for a treatment, both as to plan and elevation, peculiar to itself. Its main façade, being composed of three planes, of which the two outer do not agree in angle with the central one taken as a base, naturally forces the designer to adopt some means to connect these in such a manner as to overcome their differences, and present a harmonious and balanced frontage. For this purpose I have introduced circular towers at the junctions of the planes, which fit the rounded angles given on the plan of site furnished me; and further, I have kept my building fully up to the boundaries of the site on this western end, and by balancing the lengths of the flanking sides I am enabled to effect a saving in area of land required of 264 square yards, in a strip 9 ft. wide along the eastern boundary.

The main entrance from an architectural point of view must naturally be placed in the central one of the three planes. This I have recessed, and flanked on either side with pavilions and the towers before mentioned. The resultant effect of this treatment is to give a feeling of breadth to the central block, and so assist to emphasise its importance in the composition. In this matter the towers give a great assistance, as can be seen by reference to the perspective view, which is a true rendering of the plans and elevations, and in no way forced. I am, of course, aware that the entrance in this position is not in the line of approach from the shipping offices, which is altogether from the Eastern side, from the James-street and Water-street direction; but in a building of this size it is neither desirable or possible to provide one entrance which shall serve all purposes. Therefore, minor but still important entrances have been provided from Brunswick-street and the proposed new street, both of which will be more in general use than the main entrance.

In the internal planning of an office building the chief essential requirement is simplicity of corridor arrangement; and this, to avoid all confusion, should be an absolute repetition on each floor. The way about when once inside the building should be an obvious one, and it must be possible to be in touch with all departments on any floor without having to travel far out of a direct course from point to point. By the scheme I give, all these points are adequately met, and it would be impossible for any one to experience the feeling of being 'lost' (a complaint often made in connexion with large buildings). Fitting this into the square shape of the building, and using the spandrels for light courts, and with other light courts as the plans show, this main corridor and all minor corridors are lighted by windows opening to the outer air—practically throughout their entire length. I have arranged this main corridor to give entrance to offices and staircases only, and have entirely freed it from all direct communication with the vent cuts to the several lavatories—the coal lifts, janitors' rooms, service stairs, &c.—which are all planned to open from minor corridors, giving them a very desirable seclusion. All the vent cuts are fully open to the outer air on one side and to the larger areas on the other, so that thorough cross ventilation will be ensured, and by their being situated away from the offices the lavatories will give no offence. The internal arrangements of these places are fully indicated on the plans, and the accommodation provided is ample in water-closets, urinals, and wash-basins; and they are conveniently disposed so that no great distance has to be traversed from a given point. I am of opinion that to group this accommodation to one point is unadvisable for a building of so large an area, and would prove exceedingly wasteful of time and in every way inconvenient. The accommodation for ladies is made on the first floor, and could be repeated if requisite on any of the floors over. The vent cut in this instance is for an obvious reason made to be entered from the main corridor. The internal areas for corridor light and ventilation are large enough for the purpose they have to serve and are planned with all due economy of space; these and the main central light court will be faced with white glazed brick. This court has been made of such a diameter and size as to ensure all the offices grouped around it being efficiently and pleasantly lighted, with the outlook as agreeable as possible, and it is the only court giving light to offices. The office accommodation asked for in the various departments demands a plan which shall permit of large general offices, to which the public will have access, being provided on each of the several floors, and here again my corridor shape fits in and helps the scheme as the plans show, and at the same time allows the smaller rooms to be planned in connexion with them with economy of space and all convenience. . . .

The lighting of the building would be by electricity, with all wires laid in armoured coverings, all properly grouped and with switch, cut off, and fuse boxes, and so arranged that the burning out of a fuse would not cause any part of the building to be left in total darkness. The heating would be by steam, from boilers situate in the centre of the building on the basement floor. Radiators would be fixed in the window recesses, with ventilator bases connected with fresh air inlets from the outside, as shown on the sections, and the heating would be planned as a complete system for the entire building, including all vestibules, halls, and corridors, so that there would be an equable temperature throughout, with a consequent absence of all draughts. I am of opinion, based upon personal experience, that with a building properly heated and ventilated, fireplaces, except for appearances, are superfluous, and also entail unnecessary expense both in the building of them and in their use.

The ventilation is shown in principle on the sections as far as the small scale to which they are drawn would permit. The inlets are described above. The outlets would be by flues in the corridor walls carried up to the top of the building, and there connected to a foul air trunk formed above the ceiling of the main corridor on the top floor. This trunk is divided to work sectionally from three points, so as to ensure even extraction throughout and avoid long pulls, fans at each outcast being provided, driven by electric power. Two of these outcast shafts appear on the new street elevation and the third is in connexion with the fleche on the main façade. . . .

The construction throughout would be fireproof, all ironwork been thoroughly encased, and columns, exposed girders, &c., lathed with expanded metal and plastered. The floor construction would be steel joists and girders, with concrete breeze filling between. The roofs would all be of steel construction, properly encased, the portions slated having tee bar purlins, with porous terra-cotta slabs between, bedded in cement. The flat portions would be constructed similarly to the floors, and finished with asphalt. No timber for constructional purposes would be used, and such as will be used for finishings, &c., I would suggest should be fireproofed by the non-flammable process.

The materials will be:—For the street frontages, stone from either the Old Darley Dale, Derbyshire, or the Cefn quarries; external steps, a fine grade of Yorkshire stone; internal walls and the backing of stonework, brick; slates for roofs, green Westmoreland; crestings and gutters, stamped sheet copper, as also the encasing of the fleche; copings and internal sills, York stone; area and light-court facing, white glazed brick; basement floor, concrete throughout; corridors and lavatories, mosaic finish; office floors, pitch-pine boards on embedded sleepers; boardroom floor, oak parquetry, and English oak panelling from floor to spring of ceiling; doors, casings, and trim throughout, oak; windows glazed with plate glass, skylights with rolled plate, protected with wire guards.

The architectural treatment of the façades is conceived on broad and dignified lines, in which massing and grouping are used for emphasis, rather than any particular elaboration of detail, and I think the resultant effect of my efforts is a building thoroughly in keeping with its purposes, strong in character, and in no way over elaborated. The style is an adaptation of modern French Renaissance."

SQUARE TOWER WINDOWS IN EAST ANGLIA.

THOSE who know Norfolk must be familiar with the constantly recurring feature, in the church towers of the district, of a small square traceried opening, generally a little above the middle of the height of the tower.

The illustrations are a small collection of examples of these traceried openings, drawn by Mr. E. J. [illegible]. They show some of the various methods of treating this square opening which are to be found among the churches on the coast of Norfolk.

THE SANITARY INSTITUTE CONGRESS IN PARIS.

IN response to a cordial invitation from the French Society of Hygiene the Sanitary Institute commenced a series of meetings (held in Paris) on Tuesday last week, when a number of members of the Institute, who had started from London on Monday, August 6, were welcomed by Professor Gréhant, President of the French Society, and some of its leading members, at the Zoological Museum of the Jardin des Plantes. Among the members of the Institute taking part in the visit to Paris were Professor Corfield, the President of the Congress; Dr. Wynter Blyth, Mr. de Courcy Meade, M.Inst.C.E., and Mr. W. H. Grigg, Presidents of Conferences; Mr. E. White Wallis, Secretary of the Sanitary Institute, and delegates from the Sanitary Inspectors' Association and other bodies interested in questions affecting the public health.

The proceedings, which were held in the lecture-room of the Zoological Museum, began with a cordial welcome offered by Professor Gréhant to the members of the Sanitary Institute, a compliment which was acknowledged on behalf of the Institute by Professor Corfield. In an inaugural address Professor Corfield showed by statistical tables the favourable influence that the study of sanitary science, and the various enactments intended to give practical effect to those studies, had exerted upon public health. In the period from 1851 to 1870, during which the Nuisances Removal Act of 1855 and the Sanitary Acts of 1866 had been put into force, the average death-rate per 1,000 of the population of London was 24·1. During the period 1870 to 1890 this rate had been reduced to 22·5, in the period 1891-5 to 20·2, and finally to 18·8 in the period from 1896-9. The death-rate for England and Wales had in the same way been reduced from 22·4, before the passing of the Public Health Act of 1875, to 20·8 five years later, and to 17·4 for the period from 1896 to 1898, the latest for which figures are available. In a third table Dr. Corfield compared the vital statistics of the decades 1861-70, 1871-80, 1881-90, and of the shorter periods from 1891 to 1895 and from 1896 to 1898 in regard to certain diseases; but these comparisons belong rather to the medical aspect of the subject.

The first day's sitting of the Congress was supplemented by a visit to the French section of the Exhibition, where the extensive exhibits of the Pasteur Institute were examined and explained. The English and French members of the Congress breakfasted together before the visit, at the Café Lyonnais at the Exhibition.

Conference of Medical Officers of Health.

Dr. Wynter Blyth, on being introduced by Professor Corfield, took the chair as President of this Conference, and gave an address on "International Sanitary Regulations with regard to the Control of Infectious Diseases." He concluded his address by proposing two resolutions. The first ran as follows:—

"That in the opinion of this Conference success in the international control of the diffusion of infection from country to country is likely to result from an organised system of medical inspection and of reciprocal information, and the isolation of travellers found to be actually suffering from infectious disease."

The second resolution suggested the advisability of the Council of the Sanitary Institute approaching her Majesty's Government, suggesting that the Government convene a sanitary conference, composed of delegates from all civilised governments throughout the world, with a view of ascertaining how far general rules could be adopted as to the control by land and sea of the diffusion by travel and commerce of all the more important infectious maladies.

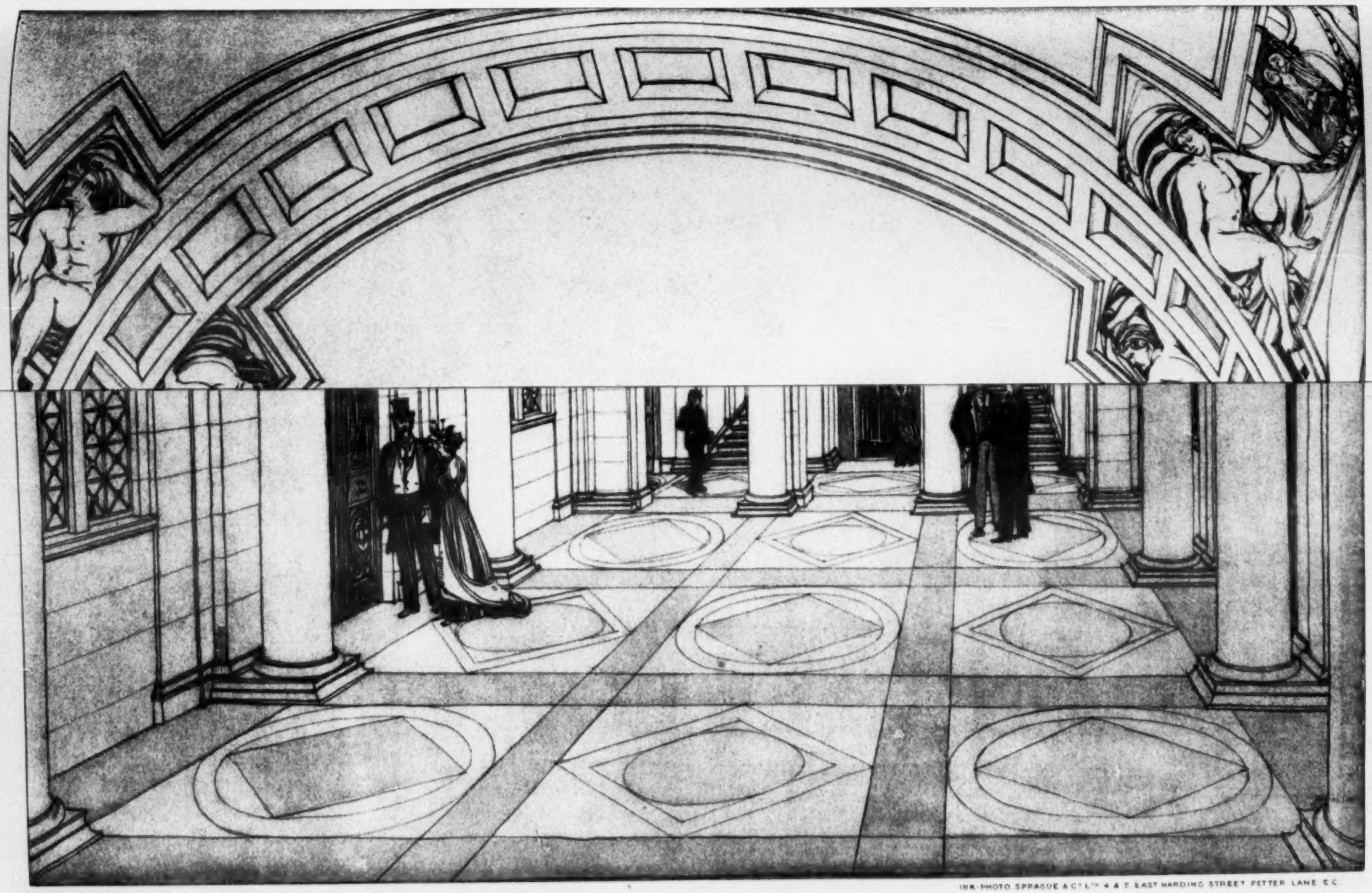
Professor Corfield, in proposing a hearty vote of thanks, opened a discussion by referring to some of the points raised in Dr. Wynter Blyth's address.

Dr. Boobbyer, Nottingham, seconded, and the motion was agreed to.

Dr. Wynter Blyth, having replied, put the first resolution he had proposed, which was agreed to.

The second resolution was also put and carried unanimously.

After the morning sitting, the afternoon was spent in visits to the central section of the sewers of Paris, and in a visit, under the direction of M. Lannay, Chief Engineer of the Commission for the Sanitation of the Seine, to



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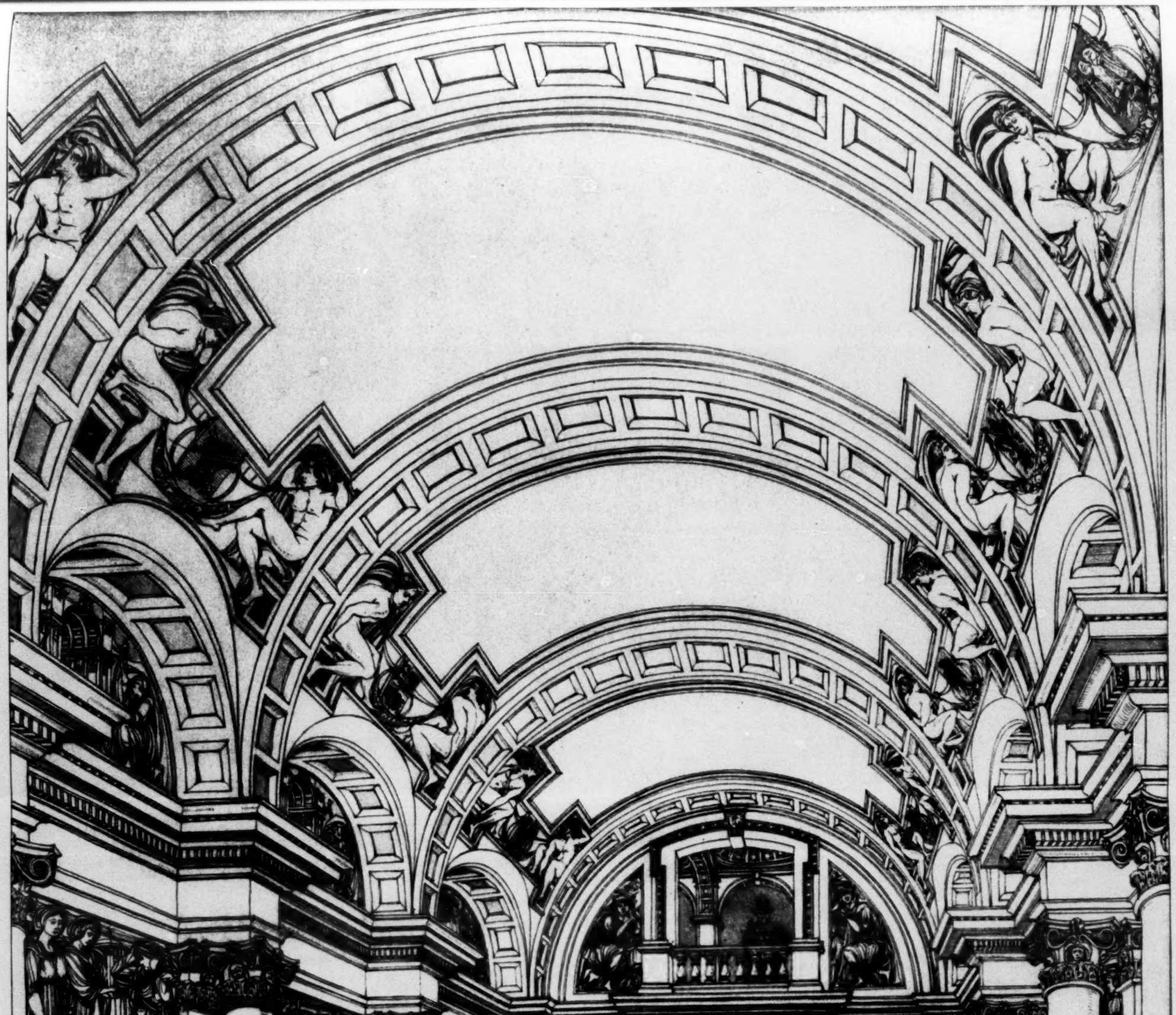
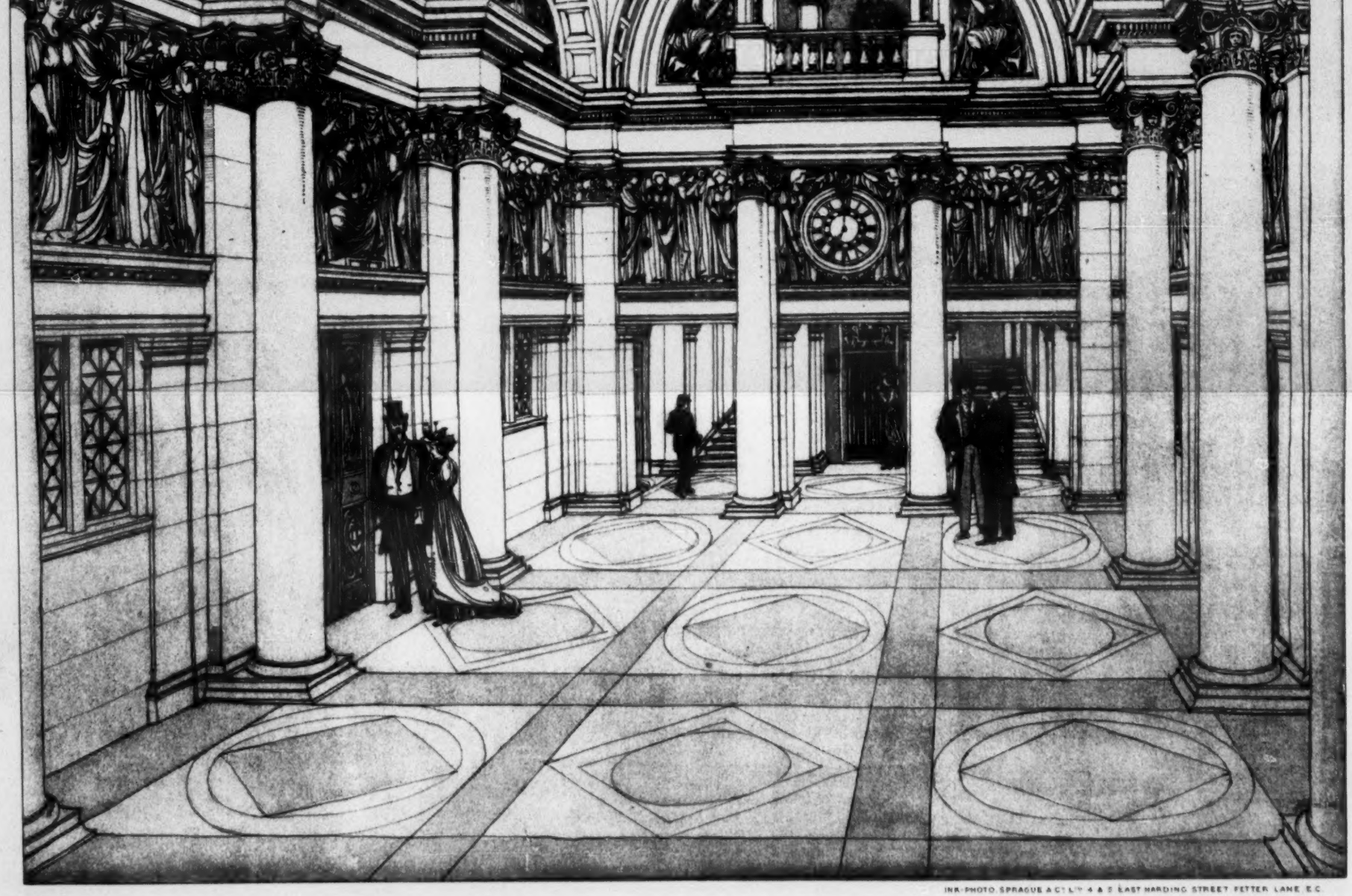
NEW BUILDINGS FOR THE EASTERN TELEGRAPH COMPANY: VIEW OF MAIN ENTRANCE.—Mr J Belcher, A.R.A., Architect





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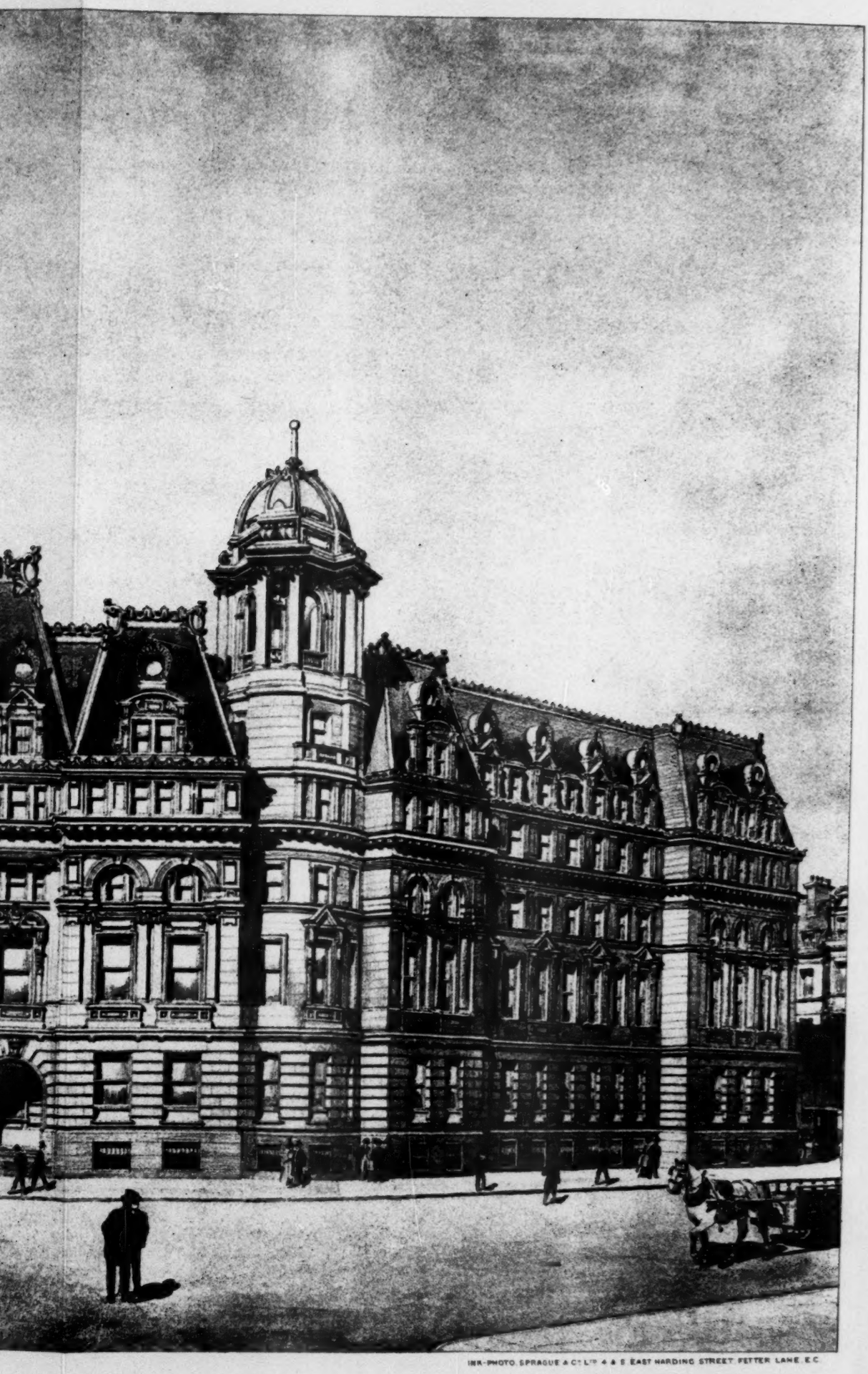
NEW BUILDINGS FOR THE EASTERN TELEGRAPH COMPANY: VIEW OF MAIN ENTRANCE.—Mr. J. Belcher, A.R.A., Architect

LIVERPOOL DOCK OFFICES: THIRD PREMIATED DESIGN.—PERSPECTIVE VIEW.



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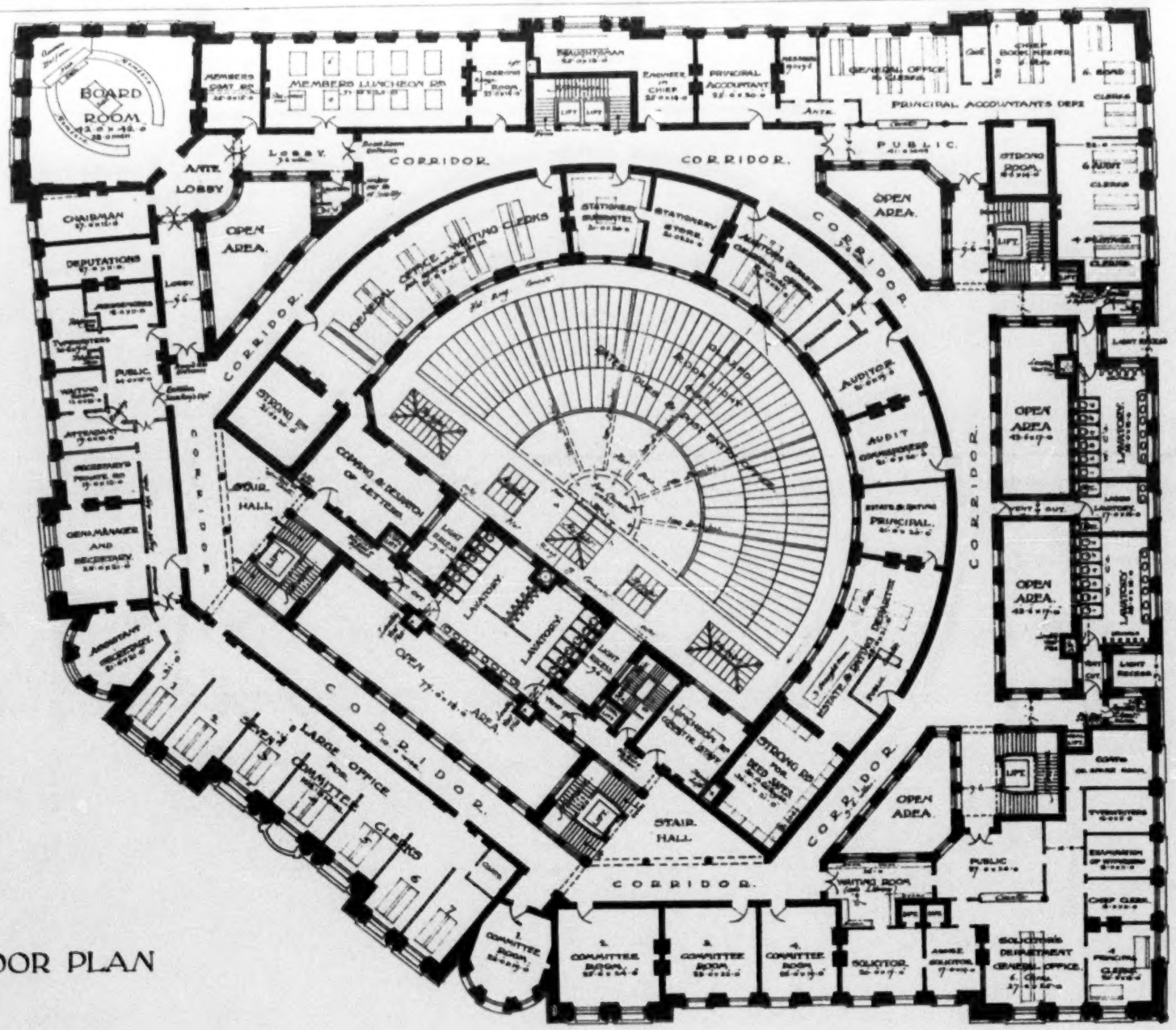
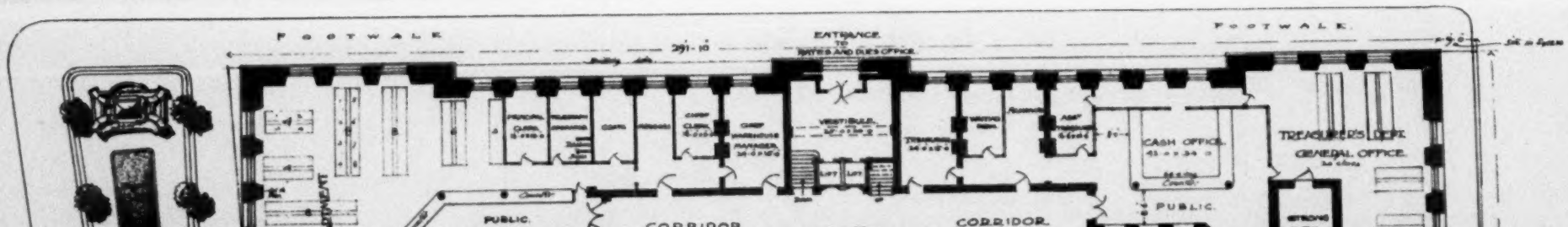
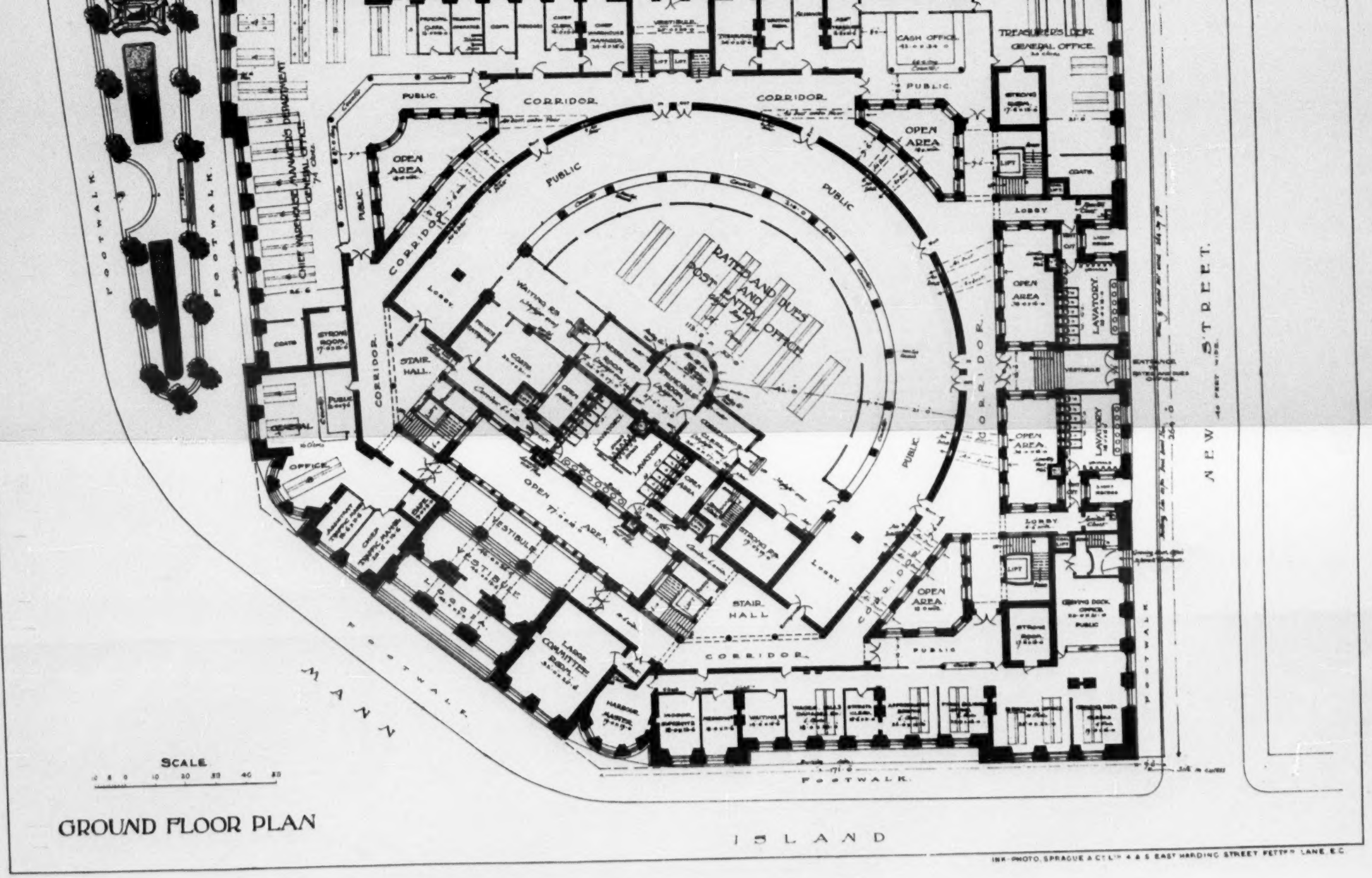
D DESIGN.—By Mr. J. H. Cook.



FIRST FLOOR PLAN

BRUNSWICK STREET.





GROUND FLOOR PLAN

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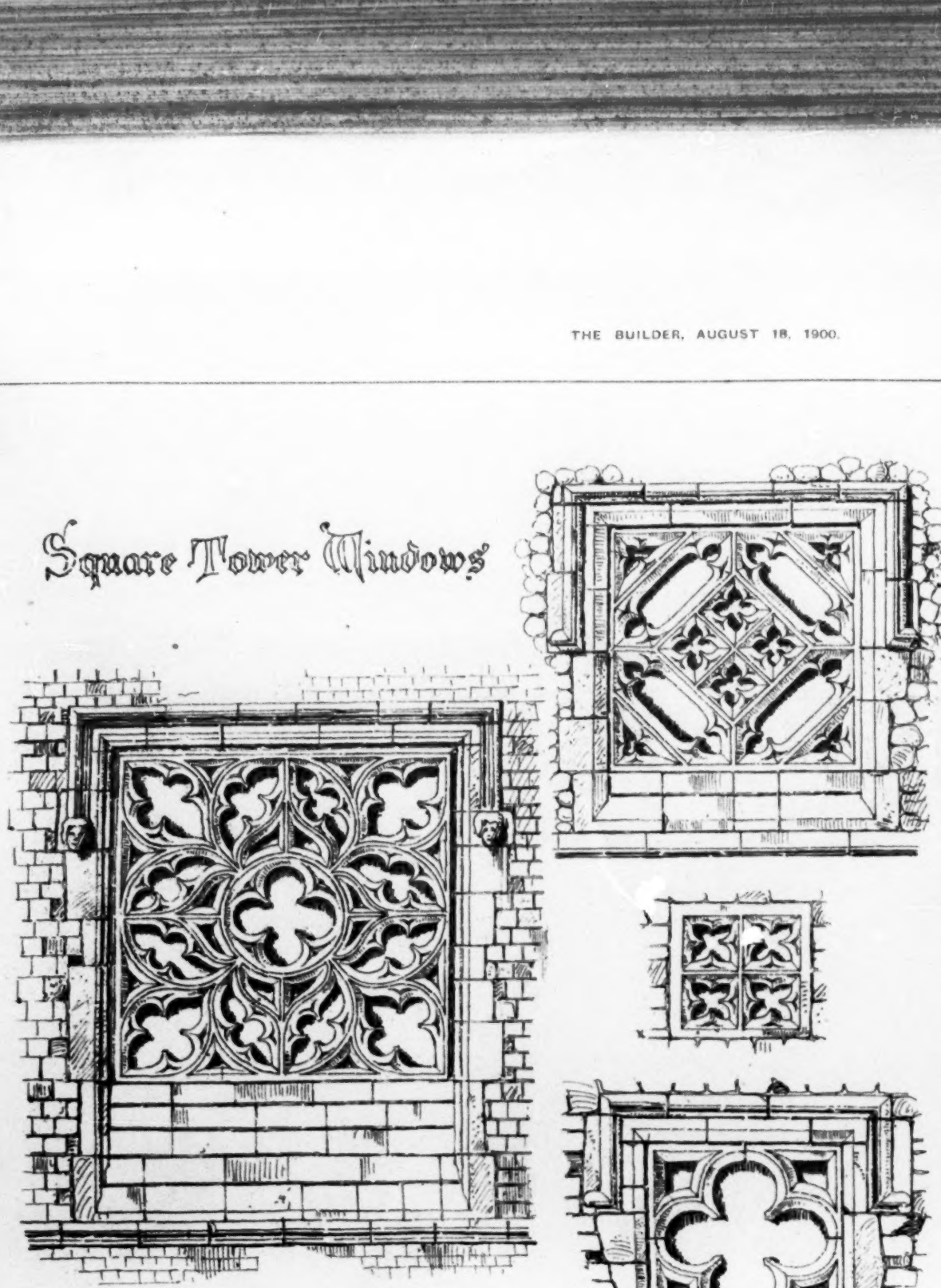
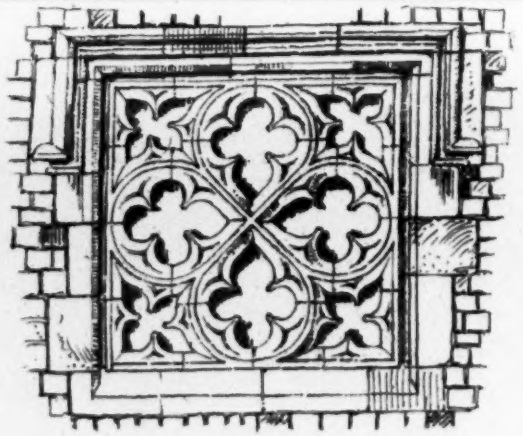
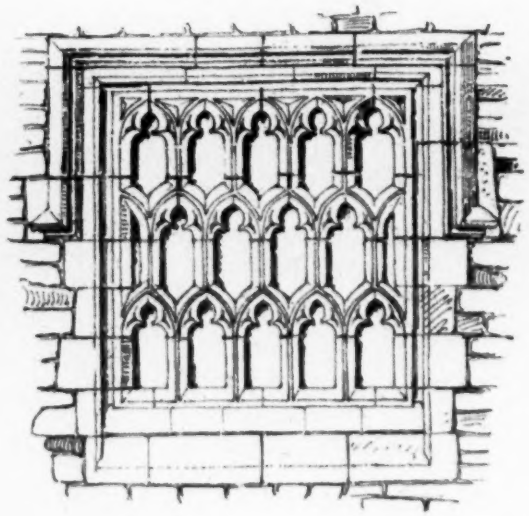
LIVERPOOL DOCK OFFICES: THIRD PREMIATED DESIGN.—By Mr. J. H. Cook

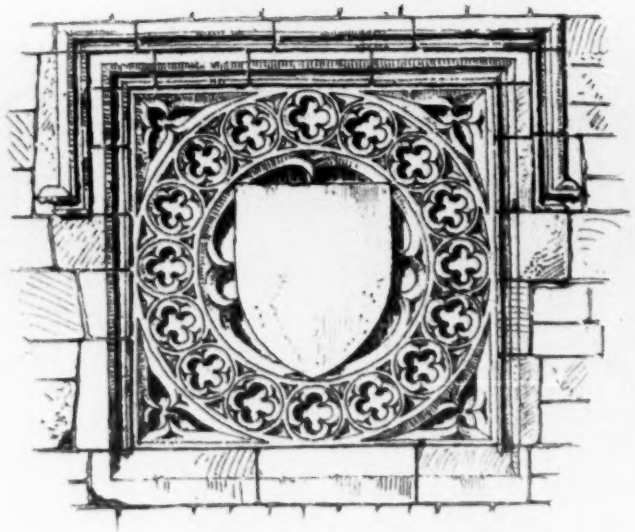
PLANS.

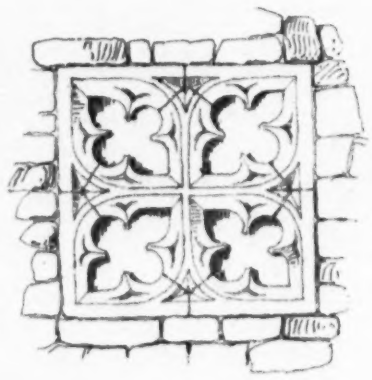
Square Tower Windows in East Anglia.

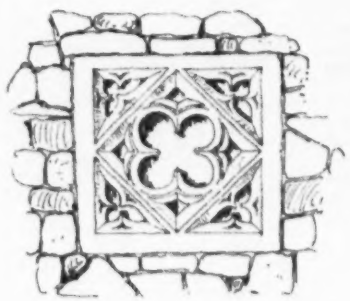


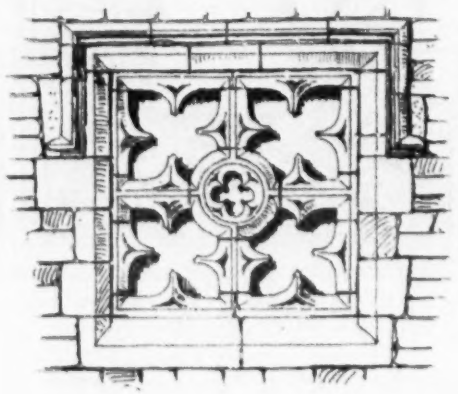












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the purification works at Clichy and the irrigation grounds at Gennevilliers.

Conference of Engineers and Surveyors.

On Thursday a Conference of Engineers and Surveyors, under its President, Mr. T. de Courcy Meade, M.Inst.C.E., City Surveyor, Manchester, and subsequently a conference of the Sanitary Inspectors, presided over by Mr. W. H. Grigg, Chairman of the Sanitary Inspectors' Association, were held at the Museum of Natural History, Professor Corfield, the President of the Congress, again presiding. Mr. de Courcy Meade, on being introduced, took the chair, and delivered an address on "The Prevention of River Pollution and the Purification of Sewage." The problem still remained to be solved of "How to prevent pollution at a reasonable cost." The question had been before Municipal Authorities, and they had been assured in every decade that the solution had been found, but they were still far from a perfect solution. Nowhere, perhaps, was there more pressing need for a solution than in certain portions of Lancashire and Yorkshire, where many of the rivers and streams were long ago deprived of their natural purity. The Local Government Act of 1888 authorised the formation of joint committees such as the Mersey and Irwell Joint Committee, which controlled the watersheds of the rivers Mersey and Irwell, an area of 482,195 acres, with a population of 2,500,000 inhabitants and a rateable value of over 10,000,000*l.* sterling. Over this area 450,000 or 500,000 factories of all kinds are distributed. In the more populous districts, where little land is obtainable for purification purposes, it is desirable, where circumstances permit, to allow manufacturers to discharge their refuse, liquid or otherwise, into a sewerage system in order to be dealt with by the Sanitary Authority, but the admission should be subject to the inspection and control of the authority, and matters liable to generate dangerous gases should be rigidly excluded. The approximate quantity of sewage effluent from towns which passes into the rivers within the Mersey and Irwell watersheds amounts to a normal flow of something like 68,000,000 gallons per twenty-four hours. Most of this sewage now undergoes treatment before admission into the rivers, and it represents about 52 per cent. of their minimum dry-weather flow, and the estimated quantity of sludge now annually removed from the sewage of the towns is about 620,000 cubic yards as against 638,877 cubic yards removed from the non-tidal waters of the Ship Canal last year.

The solids were removed by purely mechanical filtration by means of the Wilson filter. The filters erected in 1895 were supplemented last year by three additional filters and a small septic tank installation. A portion of the sewage was treated by chemical precipitation at the Manchester works, and the sludge has since been forced through a rising main into elevated tanks, from which it gravitates into a sludge steamer in about fifty-five minutes. Formerly the sludge was pressed into cake, which was thrown away (for the most part), being tipped on low land adjoining. The cost of pressing amounted to 11·5d. per ton of wet sludge; the cost of conveying it to sea was only 5·9d. per ton.

Open Spaces in Towns.

Another portion of Mr. de Courcy Meade's paper dealt with the open spaces, parks, gardens, and squares of towns. In Manchester many open spaces of small extent had been created, which were believed to exert a salutary influence on the general health of the population around them, and the Corporation had expended a considerable sum upon this work. In an appendix, the lecturer gave a list of these, and for comparison a statement with regard to such open spaces in the City of London, in Liverpool, Birmingham, Glasgow, Edinburgh, Cardiff, Sheffield, &c. In most cases no definite statement as to the effect of open spaces on the general health of the surrounding population could be obtained, but as to Liverpool a statement was made that the "death-rate in the vicinity of open spaces was much lower." It was perhaps desirable that the system of creating small open spaces adopted in Manchester should be followed by other towns. Some of these spaces were provided with trees and plants, of which the city of Manchester possesses a nursery in extensive gardens, cultivated for the purpose of supplying plants as needed.

Planning and Construction of Streets.

The minimum width of streets according to the present by-laws was not considered sufficient, as the large sums annually spent in large towns for widening streets amply proved, and in anticipation of the largely extended street locomotion of the future he would suggest that new main thoroughfares in our chief towns should have a minimum width of 80 ft., so as to admit of rows of trees being planted on each side near the footways. There should be carriageways 18 ft. wide, two lines of tramways, and a centre track for cyclists 11 ft. wide.

Subways under Streets.

Except in the City of London, in Nottingham, and one or two other towns, the adoption of subways to prevent the continual breaking up of the pavements for various purposes has not obtained in Great Britain. The paper was accompanied by a typical section through a Manchester street, indicating the pipes and other appliances belonging to the Corporation which are laid under that street. They comprise main and local sewers, drains, trunk water mains, water supply mains and service pipes, hydraulic power mains and service pipes, gas trunk mains, supply mains and service pipes, telephone and telegraph pipes and conduits, pneumatic tubes, electric light and power conduits, and distributing electricity mains and services. All these sewers and pipes require provision for inspection, and in some streets no space is left for extensions; when, therefore, it becomes necessary to duplicate some pipes great difficulty is experienced, and the alteration or removal of existing pipes on an extensive scale is often necessary.

Street Cleansing.

"The question of street cleansing more nearly concerns the sanitary reformer than street construction, because ill-scavenged streets cause discomfort and have a bad effect upon the general health of the residents of the vicinity. The cost of cleansing the streets in the City of Manchester has varied from about 1s. to 2s. per 1,000 yards cleansed per annum during the past fifty years. In the same period the cost on the rateable value has varied from ¼d. to 3⅝d. in the pound, whilst the rate of labourers' wages has increased from 12s. 6d. to 21s. The net expenditure has increased from 7,714*l.* to 44,527*l.* per annum, the area cleansed having also increased from 118 million square yards to 554 million square yards."

In conclusion the President said: "I would observe that I selected the subject of streets, open spaces, and subways as being most suitable for discussion in this city, where the magnificent boulevards, avenues, and streets surpass those of any other city. I remember many years ago being permitted by the City Engineer to inspect the subways of this city, and to those of you who have not done so I would strongly recommend a visit to underground Paris before you leave, and the visit arranged for this afternoon will give you an opportunity of doing this."

Professor Corfield, in proposing a cordial vote of thanks to the President of the Conference, regretted he had not said more of his own work in Manchester. Mr. Cowan (Local Government Board, Ireland) seconded the vote of thanks, and congratulated Mr. Meade on the Sanitary Museum originated by him at Hornsey twelve or fifteen years ago, as well as upon the value of the work he had done since in Manchester, the classical reports of which city might provide valuable hints even to Paris.

The vote was unanimously accorded and briefly acknowledged by Mr. Meade, and discussion followed, the leading speakers being Dr. Rideal, Mr. Rudolf Herring, a sanitary engineer from the United States, and Mr. Roechling, of Leicester.

Dr. Rideal said the difficulties experienced in England and all other countries in this matter had arisen from past legislation, and they were not now avoidable. It was possible under certain circumstances to allow a certain amount of sewage matter to go into streams. The problem was to ensure that streams should remain pure. Future legislation should be based upon the ratio of the volume of a stream to the volume of sewage matter discharged into it. Large volumes of sewage might go into a large stream without detriment to towns lower down, even where the water was used for drinking purposes. The Legislature should establish a ratio between the volume of a stream and the volume of sewage proposed to be discharged. At Manchester the effluents had been tested by the incubation test, and it was found that where the discharge was not sufficient to render the water putrid upon being kept for a certain time, then the water of the stream was in a satisfactory condition. It was found that where the oxygen remaining in a stream did not fall below 50 per cent. the water would remain in a satisfactory condition. The adoption of this principle would do away with all questions as to standards of purity, which were always more or less unsatisfactory. Mr. Meade had shown that the secret of success was to arrange for manufacturers to discharge their effluents gradually and not in flushes. If that were done we should have no trouble in dealing with the sewage question except in cases of some special classes of manufactures. Breweries or soap factories, for instance, should be required to discharge slowly. In America they had no trouble of this kind, because its streams were much greater than ours. The trouble in England arose from our small sources of water supply.

Mr. Rudolf Herring, U.S.A., referred to the special difficulties sanitarians had to contend with in America, where municipal government was a failure. A civil engineer would be appointed for a year or two, and sometimes four years, and then he must go out on account of a change of Government. If he could not remain in office long enough to carry out plans he might have made or might be engaged upon, he could not possibly have the same interest in his work. This made a great difference in the efficiency of all officials in his country. The water supplies in his country were not so good as in Europe. They were now demanding better water because bacteriological science had shown that good looks did not make good water. In Plymouth there was an outbreak of typhoid in winter, and a search for the cause revealed the fact that it had been the practice to throw the excreta on snow. This accounted for the remarkable circumstance that it was precisely in a part of the town supplied with the purest water that typhoid had broken out. They must keep out germs, and this had suggested the filtration of all water, even that which was derived from the mountainous regions. The supply of water demanded and supplied in the great towns was large. In Philadelphia the daily supply was 160 gallons per head, in Buffalo it was 200. They had little difficulty in the disposal of sewage. They could throw sewage into a river, and it could not be found even with the aid of chemistry. It was so in New York and in Philadelphia, where they had the Delaware River. At Chester, twelve miles below the city, they drank the water. At Chicago they had had some trouble when the sewage was discharged into Lake Michigan. They had now constructed a channel into which the sewage was turned, and then the water of the lake was let in to dilute it in such volumes that it had raised the level of the Mississippi by a foot.

Mr. Roechling, Leicester, said he agreed with Dr. Rideal that in the treatment of sewage they must split up the solid matters. The outside of a lump of excreta was aërobic and the inside was anaërobic, but he would prefer to split it up by screens or other mechanical means. River pollution was a question of standards. He was of opinion that where a water supply was drawn from a river, the sewage turned into it ought to be purified first—whatever process they had. The first necessity for successful treatment in any process whatever was good management. They must educate their sewage-works managers, and County Councils must take up that phase of the question or they would not succeed. Effluents from bacterial (self-purification works) should be regularly and carefully observed. Often it would be found that luxurious vegetation had been set up, and this in turn was liable to set up putrefaction.

Conference of Sanitary Inspectors.

Professor Corfield now called upon Mr. W. H Grigg, the President of the Conference of Sanitary Inspectors, to take the chair. In the address with which Mr. Grigg opened this Conference, "The Status and Duties of a Sanitary Inspector in England" was the subject selected for discussion. After expressing gratitude for "the magnificent reception" given by the French Society of Hygiene to the Sanitary Institute and the Sanitary Inspectors, Mr. Grigg said the object of Conferences such as these was to enable every participator to

extend his knowledge of the subjects discussed and to compare experiences in order that the best systems of work might be arrived at. He would confine himself to a review of the status and duties of an officer who in England is universally regarded as essential to efficient sanitary administration (the sanitary inspector). It would be approximately correct to attribute the appointment of sanitary inspectors to three Authorities, County Councils, Urban Sanitary Authorities, and Rural Sanitary Authorities, though there were occasionally appointments by Port, Sanitary, and other Authorities, and it would be most convenient for their Parisian hosts if he limited himself to the position and work of the London inspectors, and not those of general England. The London County Council, the one chiefly concerned, "is composed of 137 members, elected by Greater London, having a population of 6,652,145, and a rateable value of 45,093,000*l*., and is the authority for that part of sanitary administration which is best centralised. The remainder is under the Urban Authorities, of which there are forty-two in London, varying in population from 350,000 to 11,750. These are by law compelled to appoint 'a sufficient number of properly qualified men as sanitary inspectors.' 'Sufficient number' is not defined, but is generally accepted as meaning about 1 to every 20,000 of population, and, as a matter of fact, there are about 260 sanitary inspectors in London alone. If this 'sufficient number' are not appointed, the Local Government Board have power to compel the defaulting authority to appoint them, or, if they fail to comply with an order to do so, the Local Government Board may themselves appoint. It has never yet been necessary for the Local Government Board to exercise this veto." The duties of the sanitary inspectors were enumerated as referring to nuisances, complaints of infractions of the law, enforcing regulations referring to offensive or noxious trades, supervision and examination of food exposed for sale, offences against the Food and Drugs Acts, keeping animals, &c., prevention of smoke, inspection of drains and sanitary fittings, proper housing of working classes, regulation of lodging houses, inspection of canal boats, inspection of dairies, cow-sheds, and milk shops, regulation of slaughter-houses and workshops. From this list, which was by no means exhaustive, it was obvious that to perform these duties efficiently a sanitary inspector must be a man of no mean talents. The possession of the necessary requirements was ascertained by examination, and the certificate of the Sanitary Inspectors' Examination Board must now be possessed by every aspirant to the office. The syllabus of subjects for examination was given in the paper, together with the regulations as to qualifications of candidates and the payment of fees. In conclusion, the paper set forth the heads under which it would be well that the subject should be discussed, namely :—

1. The desirability of a Ministry of Public Health.
2. Cremation of the bodies of persons dying of infectious diseases.
3. Security of tenure and superannuation of health officers.
4. Whether discovery that tins of (A) meat, (B) fish, and (C) fruit, are "blown" is a sufficient reason for seizing them as containing unsound food.

Dr. Wynter Blyth, in moving a vote of thanks to Mr. Grigg, said they must all feel under an obligation to him for his very able and very useful address, which would give their friends of France an exact idea of the work of the sanitary inspector in England.

Mr. Curtin (Chief Sanitary Inspector, Lincoln) seconded the vote, which was supported by Messrs. Ollett (Eastbourne), Barralet (Godstone), and Bastiman (Chief Sanitary Inspector, Scarborough). The proposition having been carried by acclamation, Mr. Grigg responded.

The President of the Congress said it only now remained to conclude their very pleasant proceedings, and to accord their thanks to Professor Gréhant (President of the Society of Hygiene), M. Lavier de la Chanière (Vice-President), M. Gothain (Secretary), M. Bechurann (City Engineer of Paris), M. Lannay (Chief Sanitary Engineer of Paris), with their coadjutors, M. Masson, M. Betillon, and assistant engineers. The proposal was carried with acclamation. These gentlemen having severally replied, Mr. White Wallis, Secretary of the Sanitary Institute, proposed a vote of thanks to M. Perrier for providing them with that hall in which to hold their meetings. This and other votes of thanks, which included M. Fouveau de Courmelles and Mr. Nicholson, were carried by acclamation, and the Congress then closed.

In the afternoon, a visit was paid by several hundreds of the members of the Congress to the exhibit of the Paris Municipality (Pavillon de la Ville de Paris), which forms a part of the Exhibition buildings on the north bank of the Seine.

HEALTH CONGRESS AT ABERDEEN.

The Architecture and Engineering Section of the Congress of the Royal Institute of Public Health resumed its sittings in the Physics Classroom, Aberdeen, on the 3rd inst. The chair at the outset was occupied by Councillor Cooper, Aberdeen, until the arrival of the President, Mr. Honeyman, Glasgow.

The meeting at the outset took up the discussion on the paper of Mr. Fletcher, London, read the previous day, on "The Architecture of the Twentieth Century." A vote of thanks was accorded to Mr. Fletcher for his paper.

Fever Hospital Construction.

Mr. R. Morham, City Architect, Edinburgh, contributed a paper on "Suggestions on Fever Hospital Construction." In the first place, he alluded to the generally-conceded need for fever as distinct from general hospitals, and he went on to point out the need for employing competent architects; the desirability of supporting the architect with ample, but not extravagant instructions; of the distinction between ordinary and fever patients—the one class being in hospital for their own benefit chiefly, the latter not less so for that of others. The latter had a special claim to have ample provision for requirements, beyond the mere treatment of their trouble, to while away the tedium of their constrained, or in some cases even enforced, seclusion. Mr. Morham then went on to describe the stages through which patients passed in ordinary course in hospital treatment, and for illustration of the subject exhibited a block-plan of the hospital now in course of erection for the city of Edinburgh, and on it traced the progress of the patient through reception, observation, ordinary isolation, and discharge blocks, referring also to mortuary, educational, and ambulance blocks. As to the staff quarters, he specially dwelt on the risks run by fever nurses, and the need for every possible means being taken to maintain them in the best possible health condition by means of ample provision for their comfort and healthy recreation when off duty. After dealing with the kitchen, dining-room, store, dispensary, and laundry blocks, he concluded by pointing out that the object in view in all such institutions was to do the best possible for the patients during the period of their illness and for their comfort and recreation during convalescence.

Dr. Skinner, Willesden, said it was important that each ward should be large enough to accommodate a sufficient number of patients for a nurse to take charge of. He thought this was a better arrangement than having two smaller wards.

Mr. Morham said he agreed with Dr. Skinner. In a large hospital it was always desirable that the wards should be large enough to give employment to one nurse; but in small hospitals this could not always be done.

An Ideal Workman's Cottage.

Councillor Cooper, Aberdeen, read a paper on "An Ideal Workman's Cottage." His proposal, he said, was of a practical character, relative to the housing problem, as it affected Local Authorities at the present time, and which, if it were carried out, would enable them to remove the necessity for a large section of the workers living in tenement houses, and would also in some measure prevent the overcrowding which manifested itself in every growing centre of population. The Legislature having affirmed the principle that public funds may be employed and the public credit utilised to provide properly equipped sanitary houses for working people, the question confronting them was what particular kind of house or houses might be erected to meet the needs of the case. He thought that real progress was more likely to be attained in dealing with the housing problem by keeping in view the ultimate objects for which sanitary science existed rather than by seeking to satisfy the clamant and immediate wants of any single section in the mere matter of low rents. Neither the block buildings nor the tenement or flat system had been found to answer all that was desired in the interest of the whole community. In Aberdeen, where the popular working-class house took the form of a tenement for six or eight tenants, there were indications that in districts of the city, where streets of such houses had been built, these houses within a short space of time began to reveal most of the features of the slum. Passages became dilapidated, staircases were neglected, and in backyards filth was allowed to accumulate. The fact was that too many people were crowded together under one roof, and although it might be set down as everybody's business to keep the place in order, it was really nobody's business in particular, and very soon the place wore a broken-down aspect, and would very likely be shortly occupied by a class of tenants more careless than the present ones, and would by and by become a district to be dealt with under a clearance scheme. The Aberdeen Town Council had erected workmen's houses on a piece of unoccupied ground near the centre of the city, the rents of which varied from 5*l*. 5*s*. to 9*l*., while additional buildings of a different type were being erected on the remainder of the ground. There could be no hesitation in coming to the conclusion that the ideal scheme was that of cottages on the outskirts of the cities; and in what he had to say he wished it to be kept in mind he was confining himself to local circumstances. It was a point of the greatest importance that the city had now got possession and control of the tramways, and it would not be surprising if the Town Council were to join other cities in coming to the conclusion that to provide cheap means of transit and to use the tramway for the development of the outlying districts of the city, and also to provide cottages with a small garden attached, was the best solution of the housing problem. It would not suit the purpose in view if space was not afforded for a garden, which not only prevented the congestion of air space, but afforded a profitable and healthy recreation to the occupants, and was the best way of stimulating an interest in life and home. They had almost every kind of cottage in the city of Aberdeen, but the cost of building was so great that they were beyond the reach of the working class, renting as they did from 18*l*. to 40*l*. and 50*l*. The plan he had prepared consisted of a single cottage with ground floor and attics, comprising a living room, parlour, and four bedrooms with scullery, bathroom, and a back wing. It was a Scotch custom to prepare and eat food and to sleep all in one apartment, but in his plan the bed in the kitchen was done away with, and a number of small bedrooms, provided after the English type of workmen's houses. After describing various plans in the internal arrangement of the houses, he said he thought that municipalities might with advantage purchase suitable ground and build their cottages in detached blocks of, say, two, three, and four cottages, some of them with and others without a back wing. If this were done some artistic taste could be shown in the laying out of the ground, and a considerable saving effected by reducing the number of exposed gables. As to the cost of these cottages, the figures he could give would be of little value, the cost of building differing so much in different towns and at different periods in the same town. Architects of experience had informed him that the cost in Aberdeen, confined to plain rubble masonry, in workmen's houses, ranged from 4½d. to 5d. per cubic ft. With the lowest of these figures the cost would approximate to 200*l*. without the scullery, and 300*l*. with. These figures were high, and the Act of 1890 would be of little service to them unless the period for repayment were extended to at least 100 years for both the ground and the building. Of course, the cottages referred to would not serve the purpose they had in view if they could not be let for a rent of, say, 10*l*. and 12*l*. respectively. It was not part of their present purpose to discuss the various means by which such an object should be accomplished. He was convinced that in cities which are not overcrowded the authorities would not be doing their duty if they did not take measures to prevent the growth of an evil which had been fraught with such dire results to the physical and moral welfare of humanity.

Mr. Fletcher, London, said he was afraid the problem was one that could not be solved. It was a question of pounds, shillings, and pence, and philanthropy could not enter into it. A

poor man was not a pauper, and unless a cottage could be provided at a price that a working man could pay, it was perfectly impossible to erect an ideal workman's cottage. The whole thing, so far as he could see, seemed to be bound up in the question of easy and cheap transit.

Alderman Price Lewis, Wolverhampton, said he thought the ideal workman's cottage was such as had been stated by Mr. Cooper. The difficulties were largely financial, and the solution lay more in cheap transit than in anything else. The Government having thrown the burden of responsibility on Municipalities, they ought to grant as long periods as reasonable for the repayment of loans, and even a longer period for the payment of land.

Mr. Dodd, Halifax, thought the question resolved itself pretty much into what a working man could pay. A man with 20s. or 25s. a week, and having a family to maintain, could not pay 5s. or 5s. 6d. a week for rent.

The Chairman said Mr. Cooper had given them an excellent paper, but there were many difficulties connected with the question. He supposed there were in Aberdeen, as well as in other places, a large class who were obliged to live on incomes of about 18s. or 20s. a week. These people could not afford to pay more than 2s. 6d. a week, and he was glad to hear that in Aberdeen handsome buildings were erected at rents as low as 5*l*. The great objection to working people living in the outskirts was that their children would not so easily get employment; but he thought that these cottages would do very well for the better class of workmen, and their removal would make room for the poorest class. It was in regard to the housing of the poorest class that the difficulty was, and he thought the cottages suggested by Councillor Cooper were beyond the reach of the poorest. If people could not pay the rent of such cottages, they ought not to occupy them at the expense of others. Indeed, in dealing with the whole question of the housing of the working classes, there should be none of the pauperising element introduced.

House Drainage.

Mr. Gilbert Thomson, C.E., Glasgow, contributed a paper on the design and testing o house drainage, considered in their relation to each other. He said he was to consider the question entirely from the structural side, and he started from the accepted view that a satisfactory drainage system should allow nothing to escape into the house or into the soil on which the house stood. The most popular test at present was the well-known "smoke test." In many respects it was useful, but it was responsible for a great amount of false security. The statement that a drainage system was proved to be tight by means of the smoke test was scientifically absurd, as such a test could never give proof of the air-tightness of a drainage system. It was often quite as absurd in practice as it always was in theory. A test which was to be of any value as a proof of soundness must give a positive and not a negative result. The only tests in use which gave such a result were the water test and the air test. Each of these showed absolutely that the substance used in testing remained in the system, not merely that it had not been found escaping. The application of the water test was limited, because it was impossible to apply it with uniformity to the different parts of the system. The air test, on the other hand, could be applied more readily than the smoke test, and was applicable wherever the smoke test was applicable. The smoke test went on the principle of assuming that the drainage system was good until it was proved to be bad. The air test assumed that it must be proved either to be good or to be bad, and it supplied a very simple and sensitive method of proving it. It did not show where the leaks were, and was not, therefore, a convenient test for workmen tracing defects; but for an engineer or a sanitary official whose object was to certify that work was satisfactory, or merely to detect it if it was not, the air test was theoretically perfect. The constant experience of two or three years with a very simple appliance (exhibited to the meeting) had proved that the practical difficulties of its application are trifling, and that by its use the high standard of construction, referred to as being a necessary accompaniment of simplified design, could be proved not only to be attainable, but, in any given case, to have been attained. Economy and efficiency combined to demand simplicity of design, and a high standard of construction and testing.

A short discussion followed, taken part in by Mr. Fletcher, London; Mr. Ebbetts, Acton; Mr. Broom, St. Helens; and Mr. Moody, Grimsby.

[We are indebted to the Aberdeen *Free Press* for the above report.]

Correspondence.

To the Editor of THE BUILDER.

ROYAL ARCHITECTURAL MUSEUM.

SIR,—Mr. Adams says this is not neglected and uncared for. He ought to know; but I never saw a place that looked it so much. Even we in Leeds can show nothing like it for general dinginess.

I did not ask for the casts to be restored; but they must be nearly impossible to study from in their present state of grime; and if the place is not neglected, how has it got to its present condition?

Mr. Adams says the collection remains as Scott left it. It certainly looks it, and feels it. Beyond this, I see he does not dispute my statements about the lack of classification or other defects. But as he appeals for public help he must expect public criticism, and I cannot imagine a better way to frighten a subscriber away than to take him for a glimpse at the Museum.

If he or his committee can get it on a proper footing, I feel sure support will not be lacking. My visit and my letter show how useful the institution might be. What Mr. Adams says about the Architectural Association I, as an ordinary member, did not know. But perhaps the long looked-for "new premises" will provide room enough (when we get them!) for the previously declined casts.

I naturally concluded that for information as to Gothic work I should be safe in going to the Museum, but I came away sadder and wiser.

May I call Mr. Adams' attention to the communication "from a correspondent," which appeared in your columns the same day as my first letter. He will see that I am not alone in my dissatisfaction.

FREDK. MUSTO.

The Student's Column.

LESSONS IN ELECTRICAL ENGINEERING.

6. ACCUMULATORS—VARIOUS TYPES—METHODS OF CHARGING—EFFICIENCY—INTERNAL RESISTANCE—SMALL ACCUMULATORS.

ONE of the earliest problems which electricians tried to solve was to find an efficient method of storing electrical energy. The capacity of a central station must be sufficient to take its maximum load, even if that load be only on for a few hours in the whole year. If storage be impossible, then of necessity we must have a considerable fraction of the total plant lying idle for twenty-three hours out of the twenty-four in winter and for several months in the summer. The engines will often be working at uneconomical loads and steam will have to be kept up in some of the boilers even when there is no load on the station. It is not surprising then that inventors have been experimenting with all manners of cells, and that decided progress has been made in improving old forms and inventing new ones.

Theoretically every cell in which the passage of the electric current is accompanied with molecular chemical combinations is a storage battery. If we pass a current through such a cell and then connect its terminals to a resistance, we get a current in the opposite direction to the charging current and the cell is brought back to its initial state. Planté showed in 1860 that lead immersed in acidulated water illustrated this phenomenon perfectly. Other metals show it also, but unfortunately, with the exception of a few whose price makes their commercial use prohibitive, they are all acted on by the electrolyte.

Messrs. Thomson & Houston used sheets of metal coated with lead oxide for the positive plate and sheets of copper for the negative, both being immersed in a solution of copper sulphate. This accumulator is cheap and easy to make, but its capacity is much too small for commercial work and its voltage is only 1·25, as compared to 2 volts for a lead cell. Several inventors also have experimented with lead-zinc cells, lead forming the positive electrode and zinc the negative electrode. The electrolyte used is generally zinc sulphate. Some remarkable figures have been obtained by experimenting on these cells, and their light weight makes them very suitable for traction work. Difficulties, however, generally arise from the dissolving of the zinc by the electrolyte. They sometimes also seem to lose their charge in a mysterious way. None of these cells are yet used in commerce.

The practical storage battery of the present day is a lead cell, and it is divided into two main classes—(1) the Planté, or solid plate class, and (2) the Faure, or pasted plate class. In the Planté type the plates are made of spongy lead and are immersed in dilute sulphuric acid. Various methods of forming these plates are in use, and very different results have been obtained by slightly altering the process of manufacture. Planté put the plates in a bath of nitric acid mixed with an equal volume of water for from twenty-four to forty-eight hours. They were then washed in a 10 per cent. solution of sulphuric acid, and formed by passing a current through the cell first in one direction and then in the other several times. The effect of the pickling in nitric acid was to make the lead more porous and to greatly increase its storage capacity. One of the best known types is the chloride battery, made by the Electric Storage Battery Company, of Philadelphia. In making this battery the lead is first reduced to a fine powder, then it is dissolved in nitric acid and precipitated by hydrochloric acid. After going through several other processes, a pure spongy lead plate results. In the Faure type the plates consist of a lead grid, the holes of which are filled with lead compounds. The Electrical Power Storage Company's cells are of this class. In this cell the grid is made of a lead alloy and is covered with lead oxide, which is kept in position by an envelope which is unaffected by the action of the gases or electrolyte.

In setting up a storage-cell it is first filled with dilute sulphuric acid whose specific gravity is 1·19. This is equivalent to a mixture of four parts of sulphuric acid with twenty-one parts of water. The number of plates connected on to the positive pole of the battery is generally one less than the number of plates connected to the negative pole. To charge the battery the positive pole is connected to the positive pole of the dynamo or the positive main of the supply company, as the case may be, and a current is sent through it in the opposite direction to that in which it will flow when the battery is supplying energy. This current does work in the battery. A small amount of this work is wasted in generating heat, but a very large percentage is stored up chemically. The quantity of work stored up depends on the extent of the surface of the plates exposed to the electrolyte, and hence it increases very considerably with their porosity.

The reasons for the physical and chemical changes that take place during the charge are still unknown. The density of the solution falls at the beginning of the charge, attains a minimum value, and then rises to 1·21 or 1·22 at the end of the charge. Towards the end of the charge gases are given off freely at the plates, and the electrolyte presents a milky appearance. Fig. 1 shows the curious way in which the P.D. between the terminals of the cell changes as the charging proceeds, the charging current being kept constant. It starts at 1·8 volts, and after a few minutes rises to 2·1; it then remains fairly constant until the charging is nearly complete, when it begins to rise more rapidly. Similarly on discharging (fig. 2) it rapidly falls to about 2 volts, and then keeps constant until near the end of the discharge, when it begins to droop rapidly.

Professor Ayrton has recently pointed out the important differences in the results obtained by charging a battery of cells at constant current and at constant pressure. In the first method we start with a low voltage and then increase the voltage as the back E.M.F. of the cells becomes greater, so as to maintain the current at a constant value. This is the usual method of charging cells. The other method is to start with a high voltage, allowing at least 2·5 volts per cell, and keep this pressure constant during the whole time of the charge. In the first method we would keep the current constant and equal to A amperes; in the second method the current might initially be equal to 10 A amperes, but then it rapidly diminishes in value, and before the cells begin to give off gas is generally less than A amperes. We are thus able, by charging at constant pressure, to considerably diminish the time required to charge the battery. For example, a battery that could be charged in nine hours at constant current

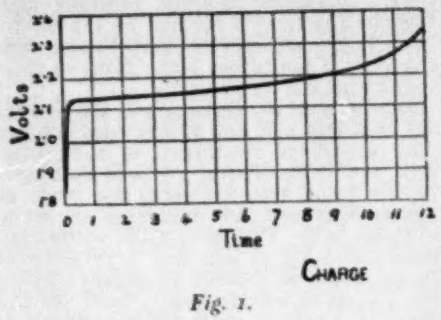

Fig. 1.

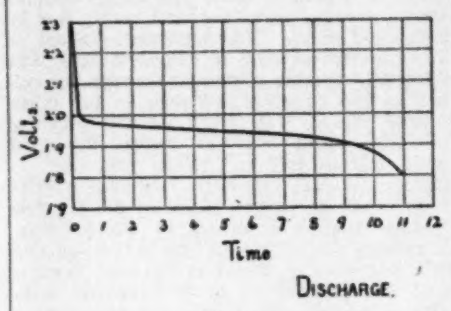

Fig. 2.

could be charged in three hours at constant pressure. Another point is that by charging at constant pressure we are able to put more energy into the battery, although there is a falling-off in its efficiency. The following table illustrates what happens :—

Method of charging.	Watt hours put in.	Watt hours given out.	Percentage efficiency.
Constant current	151·8	133	81
Constant pressure	231·2	163	71

The capacity of a storage cell is generally stated in ampere hours—*i.e.*, the number of amperes it can give out multiplied by the number of hours that elapse before the voltage falls to 1·8. The amount of energy it is giving out is, however, a variable quantity, as its voltage falls from 2·2 to 1·8. Therefore, the energy which is given out being equal to amperes multiplied by volts is a variable quantity if the amperes be kept constant, and drops in the ratio of 22 to 18. In electric lighting, as the voltage of the battery diminishes we switch in more cells, so that at the terminals of the battery we keep up a constant pressure, and hence the capacity of the cells depends on the constant current they can give for a given period—*i.e.*, the ampere hours. For traction work, what we need to consider is the watt hours—*i.e.*, the total energy the cells can give out before their voltage drops to 1·8.

A storage battery has thus two efficiences :—

1. Current efficiency $= \frac{\text{ampere hours taken out}}{\text{ampere hours put in}}$
$= 90$ per cent. (average).

2. Energy efficiency $= \frac{\text{watt hours taken out}}{\text{watt hours put in}}$
$= 80$ per cent. (average).

The current efficiency is what we have to consider when buying cells for electric lighting purposes, whilst weight and energy efficiency are all important for traction cells. Professor Ayrton's figures given above show that for traction work it will be better to charge the cells at constant pressure than at constant current. Not only will the operation take much less time but we are actually able to put 30 per cent. more energy into the battery. The energy per pound of cell is thus increased, and this far more than counterbalances the slight extra cost we have to pay per unit.

In order to keep a battery of storage cells in good working order it is absolutely necessary that the voltage be never allowed to run down below 1.8 volts. per cell. Neglect of this precaution has often caused irretrievable damage to batteries. The manufacturers will usually give a guarantee to maintain the cells in good working order for a small cost provided that they are never allowed to discharge at a higher current than their listed discharge current, and are also never allowed to discharge till their voltage falls below 1·8 volts per cell. The second of these limitations to the guarantee is more important than the first. In traction work it is even more important than in lighting work never to let the cells run down too far. It was neglect of this precaution that was the ruin of the first electrical cab company started in London. On the other hand, if cells be well looked after their capacity is found to increase slightly with age.

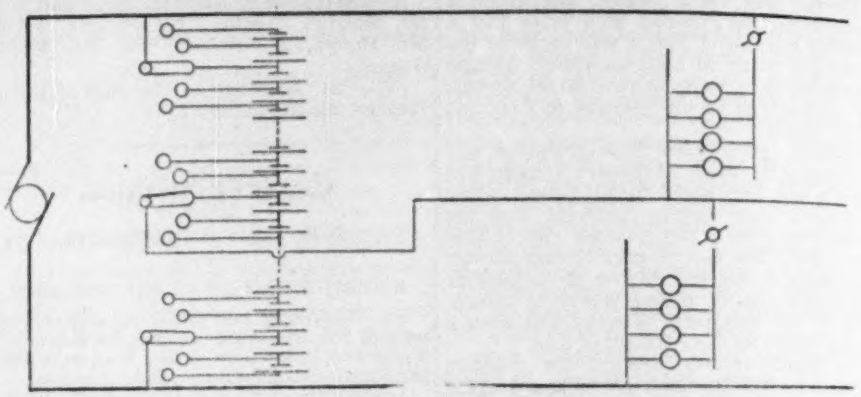

Fig. 3.

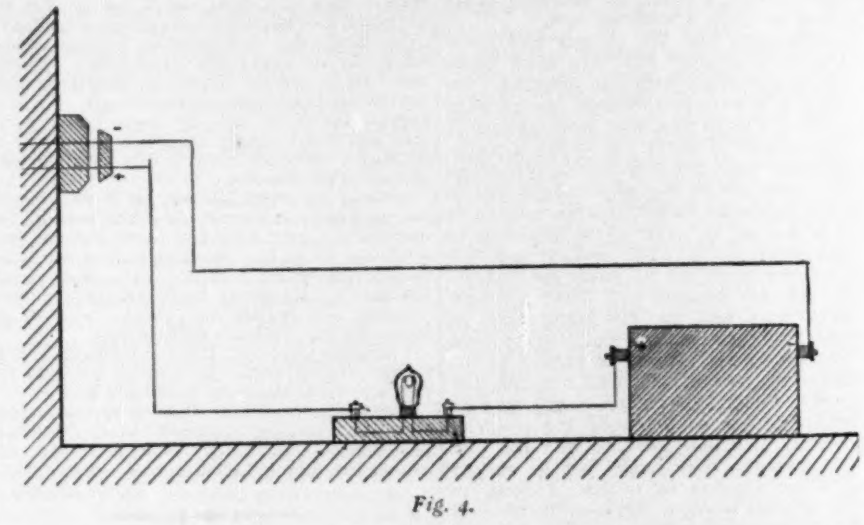

Fig. 4.

Storage cells are extensively used for steadying the electric pressure we get from a dynamo. For example, suppose we have a battery of cells across the terminals of a shunt dynamo which is supplying glow lamps in a house. Then at light load part of the current from the dynamo is charging the cells and part supplying the lamps. When there is a heavy load and the voltage falls, then the battery helps the dynamo to supply the necessary current for the house lamps. They are also used for three-wire systems (fig. 3) in conjunction with a dynamo. The dynamo for example may be giving a pressure of 400 volts and yet by the aid of the battery the pressure between either of the outers and the middle main is on'y 200. If there is a heavy load between the positive outer and the middle main and no load between the negative outer and the middle main then the half battery between the positive outer and the middle main is helping the dynamo and the other half is being charged. By this arrangement there is a considerable saving in the copper required for the mains, and hence in the initial cost of the installation.

The calculations in connexion with accumulators are very simple.

Let E = the E.M.F. of a battery on open circuit,
V = the P.D. between its terminals,
r = its internal resistance,
And C = the current through it.

Then by Ohm's law, $E - V = Cr$.

Suppose, for example, that the reading of the voltmeter between the terminals of a battery is 110 volts, and that when the battery is giving out ten amperes that it is 105 volts,

Then $110 - 105 = 10r$,

$\therefore r = 0{\cdot}5$ *ohm.*

If there are fifty cells between the terminals of the voltmeter then the average resistance of a cell, including the lead connecting lugs, &c., is 0·01 ohm. It is useful to remember that lead in its solid state has only one-twelfth the conductivity of copper. Professor Ayrton found that the resistance of an E.P.S. cell made in 1888 was only 0·011 ohm per square foot of positive plate at the beginning of its charge, but at the end when the P.D. was 2·4 volts it was five times as great. When discharging its resistance was 0·009 ohm. per square foot of positive plate, and tended to decrease as the current was increased. As the large cells used in central stations have often as many as fifty-three plates, *i.e.*, twenty-six positive and twenty-seven negative, it is quite impossible to measure their internal resistance directly, as it is less than the ten thousandth part of an ohm. In this case Professor Ayrton's rule gives us a useful approximation. These large cells contain nearly a ton weight of lead each, so the price of storage batteries fluctuates considerably with the price of this metal. We may state generally, however, that the price of accumulators is about one-third the cost of the entire plant.

To calculate the number of cells required for a small lighting plant it is only necessary to divide the required voltage at the battery terminals by 1·9. Thus, suppose that the lamp voltage is 200, and that 10 volts are lost in the mains, then the number of cells required is $\frac{210}{1{\cdot}9}$, *i.e.* 110. At first only 100 will be required, but as the volts go down the others can be gradually switched in so as to keep the pressure constant at the lamp terminals.

It is of the greatest importance to keep the battery-room well ventilated, and to keep it as isolated as possible. All the wood-work should be protected by acid-proof paint, and all metal-work should be protected with several coats of shellac varnish, or with vaseline. Copal varnish will be found very useful to protect instruments and terminals from the corrosive acid spray.

As small accumulators are now extensively used for lighting carriage lamps, bicycle lamps, working small motors, for telegraph, telephone, and bell work, &c., a few hints as to charging them may be useful. When a direct current supply is available from the house mains the best method of charging them is as in fig. 4. The positive end of the battery is put in series with a lamp, and connected on to the positive terminal of a wall socket or switch, and the other end to the negative terminal. The maximum charging current is always stated by the makers, and this ought not to be exceeded. Suppose that the charging current is to be 0·6 ampere, then a 16 C.P. 100-volt lamp will give this current on a 100-volt circuit, or a 32 C.P. 200-volt lamp on a 200-volt circuit. As a rough rule, we may say that the current is propor-

tional to the candle-power at a given voltage, and hence by varying the lamp we can get any required current. It is necessary to be careful not to short circuit the wires where they leave the wall plug. To tell which is the positive wire of the house circuit Ampère's rule and a small "charm" compass are all that is required. Imagine yourself swimming with the current, *i.e.*, from positive to negative, and looking at the compass needle then the north pole will be deflected towards your left hand. If current from the public mains is not available then they can be charged by being put in parallel with dry cells, two dry cells being required for every storage cell. The positive end of the dry cells is connected to the positive pole of the storage battery, and the negative end to the negative pole. For ringing bells, working induction coils, lighting night-lights, &c., they can be left permanently connected up in this manner. Mr. Marconi uses this system to work the induction coil required in wireless telegraphy.

GENERAL BUILDING NEWS.

REPAIR OF BISHOP'S CLEEVE PARISH CHURCH.—This large and interesting church, of many dates and styles, was reopened on the 31st ult., after being under repair for twelve years. It had fallen into neglect and decay; all the walls were in a dangerous condition (due partly to the misdoings of the mediæval builder, who had used stone coffins and other heterogeneous material in their construction), the groining of the beautiful porch was unsafe, and the too daring fan-tracery inside the door still more so; the water soaked into the foundations, and poured freely through the roofs; and the building generally was sinking into hopeless ruin. Under the late rector a move was made to rescue it, and a report was made by the late Professor Middleton in 1888. Since then work has gradually been proceeding. The walls have been underpinned and strengthened, the groining repaired and stirruped up with iron, the water carried off by proper drainage, the roofs repaired and made watertight (except in the transepts, which have yet to be done), the leading of the aisles renewed, and the old stone "slats" replaced on the nave and choir; the chancel has been repaired and refitted, and the curious mixture of plaster and paper removed from the underside of all the roofs. Outside there has been no new "feature" except a large east window. Inside, the old roofs are all now visible, retained as far as possible exactly as they were, though that of the De la Bere Chapel had to be taken down and mended with a good deal of new oak. The beautiful Jacobean gallery is untouched; also a few fifteenth century pews. New altars, triptych, and other fittings were given, and some good glass by Mr. J. Eadie Reid and Messrs. Burlison & Grylls. The church is now for the most part safe and watertight, about 4,000*l.* having been spent so far in making it so; but a good deal more is required to complete the work. The architects are Messrs. Prothero & Phillott, of Cheltenham; the builders, Messrs. Collins & Godfrey, of Tewkesbury.

CHURCH, THORNABY, YORKSHIRE.—The foundation stone has just been laid of a new church at Thornaby, for the parish of St. Luke's. The new church is to be built entirely of stone, with sneck-faced walling inside and out, and dressed stone for windows, doors, pillars, arches, &c. The whole of the wood fittings are to be of pitch pine. The roofs are to have boarded ceilings throughout divided up into panels. The present contract does not include the western portion of church, but when complete sitting accommodation will be provided for 700 adults. The plan comprises nave, aisles, and transepts, chancel, morning chapel, vestries, organ chamber, porches, &c., the total length inside the church being 111 ft., and the width across nave and aisles 55 ft., the full width across transepts being 75 ft. Only the lower portion of the tower is to be built at present, but when complete it will stand 86 ft. high above ground level to top of parapet, and will be suitable for a peal of bells. The first contract, amounting to 4,656*l.*, is let to Mr. Henry Harwood, of Manfield, Darlington. Messrs. Hicks & Charlewood, of Newcastle-on-Tyne, are the architects.

TOWER, PARISH CHURCH, SALTBURN, YORKSHIRE.—On the 7th inst. the foundation stone was laid of a new tower at the Parish Church of Emanuel, Saltburn. The architects are Messrs. Clark & Moscrop, of Darlington.

RESTORATION OF EGLWYS BREWIS CHURCH, GLAMORGANSHIRE.—This church is being restored under the direction of Mr. Wm. Weir. The work consists principally in strengthening the walls, and will cost about 500*l.*

SUNDAY SCHOOLS, READING. — New Sunday schools in connexion with St. Saviour's Church, Coley, Reading, were opened recently. The architect was Mr. Albury, and Mr. Margetts was the builder.

WESLEYAN CHAPEL, WITHERNSEA, YORKSHIRE.—On the 11th inst. the foundation stone of a Wesleyan chapel at Withernsea was laid. Messrs. Gelder & Kitching, of Hull, are the architects.

CHURCH, ELLAND, YORKSHIRE.—On the 11th inst. the memorial stone of a church in Savile-road, Elland, was laid. The architect is Mr. G. H. Fellowes Prynne.

DRILL HALL, GATESHEAD.—A new drill hall for the 2nd battery of the 1st Newcastle Volunteer Artillery was opened at Bensham on the 7th inst. The building is faced with Lowry's pressed bricks, with stone dressings to doorways, windows, &c. The hall is 80 ft. long by 47 ft. 6 in. wide, with an entrance in the centre of the main front in Liddell-terrace. The hall is lighted by rows of windows on east and west sides and on the south end, and has a continuous louvred roof ventilator on the ridge. The roof is open, with stained and varnished boarding. The hall has a pitch pine boarded floor. At the south end are the sergeants' and gunners' mess rooms, yard, &c., and at the north end officers' quarters (with private entrance from Liddell-terrace), orderly office, clothing store, armoury, and harness room, the latter being situated in the parade ground, which is at the north end, and has an entrance to the drill hall by means of an archway under the caretakers' rooms, which occupy the whole of the first floor above the officers' quarters, &c. There is a gallery, the full width of the building, overlooking the hall. The building is enclosed by a low brick wall, with iron palisading and ornamental brick piers. The contractor for the building was Mr. E. T. George, Newcastle, and the architects Messrs. Watson & Curry, Newcastle.

FIRE BRIGADE STATION, DUBLIN.—On the 8th inst. the new district Fire Brigade Station in Buckingham-street, Dublin, was opened by the Lord Mayor. 2,250*l.* was the sum paid by the Corporation for the ground on which the station stands. The station has a frontage of 78 ft. on Lower Buckingham-street, is three stories high, and contains a working department and living accommodation for an officer, seven married firemen with their families, and several unmarried men. The officer's quarters are situated to the right of the entrance door, while, enclosed by a glazed screen on the left, is the watch-room, containing the telephone and fire-alarm switchboard, and apparatus for controlling the entire working of the station, including lighting, heating, and water supply. Opening off the passage is the engine-room, 40 ft. by 28 ft. At the rear is the stable, 28 ft. by 20 ft., for four horses. The engine-room and stables, which are 16 ft. high to pitch pine ceilings, are lined with glazed bricks and are furnished with patent folding doors. There is also a polished sliding pole from the dormitories above, by which the firemen can slip down to the basement without the trouble of using the stairway. On the first floor is a dormitory, 28 ft. by 25 ft.; a recreation-room, 21 ft. by 12 ft., all of which are reached by spiral stairs from the entrance passage below. Quarters for two drivers on the extension of the same floor at the rear are approached from the station yard by an external stairs and balcony. On the upper floor residences for five families are provided in a similar manner. Another sliding pole, placed in a recess off the top balcony, gives ready access down to the engine-room. All the dwellings are isolated. The officer has five apartments, bathroom, and scullery; and, with two exceptions, the men have three rooms, every family having separate bathroom, scullery, and sanitary arrangements. A hose-drying tower, 60 ft. high, heated by steam and hot air; a small steam laundry, 24 ft. by 12 ft.; a workshop, 28 ft. by 11 ft., with engine repairing and testing pit; a harness room, 12 ft. by 11 ft.; and forage loft, 40 ft. by 11 ft., are all entered from the yard, which in itself is large enough for drilling purposes. Against the boundary wall in the yard are coal lockers, sanitary accommodation, and an open fronted shelter shed. In the basement, under the watch room, a small steam boiler, automatically controlled, furnishes hot water for the whole station, steam for the laundry, and will heat the drying tower and portions of the station by means of radiators. The frontage is of red-pressed Portmarnock bricks, with moulded granite bases to the piers. All the building is of fire-resisting construction. The building was erected from the plans of Mr. M'Carthy, City Architect, by Messrs. Pemberton & Son, at a cost of 8,000*l.*

TOWN HALL, KINGSTOWN, DUBLIN.—The interior of the Town Hall at Kingstown has been recently decorated. The work was carried out by Messrs. Sibthorpe, of Dublin, under the supervision of Mr. J. W. Berry, the Town Surveyor.

BUSINESS PREMISES, NEWCASTLE-ON-TYNE.—A block of buildings is about to be erected at the corner of Northumberland-street and New Bridge-street, Newcastle, for the Pearl Life Assurance Company, Limited. The ground floor will consist of shops, including a restaurant. The cost, including the site, will be about 100,000*l.* Mr. William Hope and Mr. J. C. Maxwell, of Newcastle, are the architects.

CATHOLIC HOME, SUNDERLAND.—A building is being erected at High Barns, Sunderland, for the Little Sisters of the Poor. Messrs. W. and T. R. Milburn are the architects, and Mr. D. Ranken is the contractor.

WORKMEN'S DWELLINGS, EAST HAM. — The foundation stone was laid on the 2nd inst. of a block of twelve houses which the East Ham District Council are erecting at North Beckton for the accommodation of persons of the working class. The buildings will be erected under the supervision of the Surveyor, Mr. A. H. Campbell.

LIBRARIES, GRANGETOWN AND ROATH, CARDIFF.—The Mayor of Cardiff (Councillor S. A. Brain) recently laid the memorial stones of the branch libraries which are being erected in the Grangetown and Roath Wards. At Grangetown, at the corner of Clive-street and Penarth-road, the new library is being erected from the design of Mr. E. M. Bruce Vaughan, whose plans were selected in a competition, Mr. H. V. Lanchester being the assessor. The building provides a reading-room, giving accommodation for 150 readers, with special provision for women and for boys. The lending library provides book storage for 7,000 volumes, and can be extended to provide for 12,000. Messrs. D. Thomas & Son are the builders. The Roath branch has been designed by Messrs. Teather & Wilson, of Cardiff, who also secured the work in open competition. The main room of the library is 65 ft. by 27 ft., and 32 ft. high, covered with an open timber roof. It provides accommodation for nearly 200 readers. The building is to be lighted throughout by electricity. The buildings are placed upon the triangular site recently purchased by the Corporation near Clifton-street in such a way that the under portion is retained for future extension. Messrs. J. S. Chubb & Co. are the builders.

BRISTOL UNIVERSITY COLLEGE.—A further addition has been made to the structure of University College, from the plans of Mr. Bligh Bond. The new building is a continuation towards University College-road of the unfinished wing containing the engineering school. It closely adjoins the medical school, terminating towards the road with a gabled end, containing an oriel window. The building, which has been erected at a cost of some 6,000*l.*, contains on the ground floor a library about 46 ft. square, also several classrooms and preparation rooms for biological work. On the upper floor is an examination hall, a room 83 ft. long by 46 ft. wide, and 31 ft. from floor to ceiling. A gallery has been arranged for at one end. The building is approached by an entrance in the main front, and a staircase leads to the first floor, lavatories and cloakrooms being provided. A private staircase of a spiral form is placed in an ornamental stone turret in the front angle of the building. This starts from the library, and communicates with the examination hall and the gallery above. Externally, the building has been designed to harmonise with the portions already constructed. It is built of red pennant stone, with freestone dressings, the style being Tudor.

FIRE STATION, REDCROSS-STREET, CITY.—The foundation-stone was recently laid of a new fire-station for the city, upon the site of the Lady Holles School, Redcross-street. The site has an area of about 4,660 ft. super, with a frontage of 90 ft. The new station will be built to the first-floor level of Portland stone with granite plinth, and above the first-floor level of red brickwork. The engine-room will be 33 ft. by 47 ft., and will be lined with glazed bricks. It will contain standing room for a horsed escape, a steam engine, and a hose cart ready for immediate use, and the chief run out will be exactly opposite Jewin-street. The stabling for six horses will be at the rear of the engine-room, with a "run in" central with the horsed escape. The watch-room will have a floor area of 180 ft., and the recreation-room an area of about 400 ft. super. The staircase over will lead into the engine-room, and the lift will be in the staircase well. A laundry, a battery-room, fourteen coal cellars, a large cellar for the station officer, a workshop, an oil store, storage for wood, and a cellar for steam coal will be in the basement, but the space beneath the steam-engine and the horsed escape will be solid. The first floor will contain officers' quarters, quarters for coachmen, and a common bath-room; whilst the other floors will provide accommodation for the men, with two common bath-rooms, &c.; and the roof over the stables will form a drying-ground and playground. The building, which will be lighted throughout by electricity, is being built under the direction of the Superintending Architect to the L.C.C., Mr. W. E. Riley.

STAFFORDSHIRE "SENTINEL" BUILDINGS, HANLEY.—The proprietors of the *Staffordshire Sentinel* are making further additions to their offices in Foundry-street, Hanley. The buildings now being commenced will form a continuation of the offices built thirteen years back, and will have a frontage to Foundry-street of about 120 ft., and will comprise on the ground floor:—(*a*) Publishing-room; (*b*) a large printing press-room to accommodate six electrically-driven machines. A staircase will be placed in the centre of the frontage, communicating with the first floor, which will be divided up into suites of offices to let off, comprising in all eleven rooms, with lavatory accommodation, and all will be heated with hot water. A floor over these offices will be devoted to store-rooms, &c. The tenders for this new block have just been opened and considered, and that of Mr. J. J. Longden, builder, of Burslem, amounting to 4,045*l.* was accepted, and the work ordered to be commenced forthwith. Messrs. R. Scrivener & Sons are the architects.

MORGUE, DUBLIN.—The City Architect of Dublin is preparing plans for a new morgue to be erected in Store-street. The cost is estimated at 5,000*l.*

SANITARY AND ENGINEERING NEWS.

Sewerage Scheme, Sherington.—A deputation from the Newport Pagnell Rural District Council have met the Sherington Parish Council, when the schemes of main sewerage, sewage disposal, and water supply were explained by the engineers, Messrs. D. Balfour & Son, of London and Newcastle-on-Tyne. The main sewerage consists in the construction of 12 in., 9 in., 8 in., and 7 in. sewers, with excellent falls, all converging to a site near the River Ouse, where it is proposed to treat the sewage in bacterial tanks, with subsequent land filtration. The water supply is proposed to be obtained from the oolite at a depth of from 50 ft. to 100 ft., and in the first instance it is proposed to have a trial boring put down, with subsequent continuous pumping for a week or more to ascertain the quantity available, and the effect of this pumping in lowering the water level.

Water Supply, Wetherby, Yorkshire.—On the 1st inst. the pumping station of the Wetherby District Water Company was opened. A temporary reservoir has been constructed, but it is proposed to build a permanent reservoir on a site near Brandon Hall, Bardsey, to hold two million gallons. The source of supply is a well in the lower millstone grit, and it is expected that a daily average of three-quarters of a million gallons will be pumped. The engineers are Messrs. J. H. Rhodes and G. H. Perryn.

Extension of Aberdeen Joint Railway Station.—In connexion with the plans for these works submitted by Mr. P. M. Barnett, Engineer-in-Chief, Great North of Scotland Railway Company, Mr. R. G. Nicol, Harbour Engineer, Aberdeen, reports that the plans show that the railway companies propose to lift the whole of the existing sidings for goods trains, and to put down forty-one entirely new sidings, five loading banks, and a large goods shed. The two railway accesses at the end of Jamieson's Quay are now to be used by the Caledonian Railway Company instead of the Great North, while the latter company apply for two connexions opposite the end of Commercial-road. Two cart entrances are applied for, one for each company, and Mr. Nicol thinks the companies' proposals are not in excess of what is required for the traffic, and will occasion less delay and congestion of traffic in Market-street.

FOREIGN.

France.—In the architectural section of the competition for the Prix de Rome, the first place has been awarded to M. Paul Bigaux, pupil of MM. André and Laloux; and the second place to M. Joseph Bernard, pupil of M. Pascal. The subject for the competition was "Un Établissement Thermal avec Casino."——The Government has acquired a valuable collection of pre-historic and Gallo-Roman relics collected by Dr. Prunières, which is to be placed in the Natural History Museum.——An exhibition of works of Russian industrial art, presented to the city of Paris by the Baron de Baye, is being arranged at the Carnavalet Museum.——Three new children's hospitals are in course of erection in Paris, and will be completed by the close of the year. They are situated respectively in the Place du Danube, Rue Michel-Bizot, and Rue Carpeaux. They are being carried out by the official architects of the Department of Assistance Publique.——In the forthcoming session the Municipal Council of Paris will give serious consideration to the subject of the shortness of water during the recent hot season, with a view to providing against this in future. It is proposed not only to tap new sources of water supply, but also to establish a canalisation from the Seine for further utilising for drainage, &c., to economise the pure-water supply.——The Municipality of Oran has voted a sum of 800,000 fr. for the building of a theatre.——The death is announced of M. Etienne Lenoir, a distinguished chemist who also was interested in gas motors and their application to automobile cars, and was largely concerned in promoting their introduction.——M. Ary Renan, the painter, son of Ernest Renan and nephew of Ary Scheffer, has died at the age of forty-two. He was a member of the Société Nationale des Beaux-Arts ("New Salon"), and was the favourite pupil of Puvis de Chavannes. He was also a gifted writer, and author of a book on the art of Gustave Moreau which attracted much attention.

MISCELLANEOUS.

Professional and Business Announcements.—The "Warrington" Bond Iron Syndicate, Limited, have removed to 28, Hyde-road, West Gorton, Manchester.

"Eltonbury" Silk Fibres.—These are self-coloured materials, made in about fifteen different shades, and are intended for use as decorative wall coverings; they are in fact a form of wall-paper, but with a texture rather different from ordinary wall-paper. The colours of the examples sent to us are calculated to be effective as surface colouring for a wall, and two may be used in combination as dado and general surface. These specimens are sent to us by Messrs. Crompton Bros., of London, who we presume are the Patentees, but they are to be obtained from Messrs. Wylie & Lochhead, of London and Glasgow. They are worth the attention of those who wish for a wall-covering material which will give a good effect of subdued colour.

Site of St. George's Church, Liverpool.—The Finance Committee have instructed the City Surveyor to report as soon as possible as to the condition of the site of St. George's Church, and also, after conferring with the City Engineer and the manager of the tramways, as to the best manner in which the site can be treated.

Proposed City Architect for Bradford.—At a meeting of the Finance and General Purposes Committee of the Bradford Corporation on the 9th inst., a suggestion was made that in order to relieve the City Surveyor's department, a City Architect should be appointed at a salary of 400*l.* per annum.

University College, London.—The following students have obtained prizes and certificates in the classes of architecture and construction at this College, under Professor T. Roger Smith:—Donaldson Silver Medal, H. E. Seccombe. Prize, J. G. Johnson. Certificates, W. S. Walker, J. R. Sykes, G. O. Howship. *Second Class*, A. C. Russell. *Third Class*, W. A. S. Pettit.—Construction. Donaldson Silver Medal, H. F. Northcote. Prize, G. O. Howship. *Second Class*, J. G. Johnson. *Third Class*, L. C. Lander.—Sketches. Prize, Amy K. Walker.——Classes maintained by the Carpenters' Company:—Architectural Drawing Class, 1st Prize, J. H. Davies. 2nd Prize, W. A. S. Pettit.—Structural Drawing Class. 1st Prize, G. H. Wade. 2nd Prize, W. Butcher. *Second Class*, L. H. Lee.—Quantity Surveying. *Advanced*. Prize, H. C. Garland. *Second Class*, T. H. Smith, G. Waghorn. *Third Class*, J. Coutts.—*Elementary*. Prize, E. T. Ferry. *Second Class*, H. E. Goldsmith, S. G. Peartree. *Third Class*, S. C. Barnet, G. J. Sima, G. T. Evans, A. J. Reis, W. F. H. Stevens. The evening class for instruction in building construction and constructional drawing, till now conducted by Mr. R. Elsey Smith, who has become Professor at King's College, will in future be conducted by Mr. A. Buchanan, the instructor in this subject at the Battersea Polytechnic.

St. Mary the Virgin, Soho.—We learn that Mr. A. R. G. Fenning is the architect for the rebuilding at the Church of St. Mary (formerly known as "Les Grecs"), in Charing Cross-road, of which the original south and west walls were recently condemned as "dangerous" by the London County Council. The church, as built in 1677 by the Archbishop of Samos for the Greek congregation, was afterwards taken by the Huguenots, and ultimately, in 1850, for the Church of England, and dedicated to the Virgin. In 1875 the church was enlarged at the east end, after the designs of Messrs. W. Slater & R. H. Carpenter, and a north aisle was subsequently added. The original church, of which nothing now remains, is depicted (but as reversed) in Hogarth's plate of "Noon."

"Old" Aberdeen.—In an ancient city like Aberdeen it is interesting to watch the demolition of old houses and the excavation of foundations for new buildings to take their place. In the course of some alterations making on a house in the Upperkirkgate, the course of the old, though not the oldest, water supply of the dwellers on both sides of the Gallowgate and Broad-street was met with lately. Leaving the loch by a sluice a little below the north end of Drum's-lane, it passed southward in an open track on the east side of Burn Court, crossed the Upperkirkgate by a bridge just outside the port or gate which closed the entrance to the city at this side when danger was apprehended. It passed through a court at the west end of the house undergoing alterations, and a stone lintel covering it may be seen from the street in the bottom of a wall. Running open it reached Flourmill Brae, where it drove a mill within the memory of many citizens. It then passed under St. Nicholas-street, under the houses on the west side, under Union-street, between No. 78 on the north side and No. 81 on the south. Here, before the houses on the south side of Union-street were built, it drove a glass-cutter's wheel in an arch under the street. Under the name of Putachie it crossed the site of the market, and, driving Tarnty Mill at the foot of Market-street, ended its course at the harbour.—*Aberdeen Free Press.*

Street Improvements, Glasgow.—The St. George's-road and Woodlands-road, Glasgow, are to be widened, and a block of buildings is to be erected at the junction of the two roads. The buildings will consist of shops on the ground floor, with warehouses at the back, the upper floors to consist of dwelling houses. Messrs. Frank Burnett & Boston are the architects.

CAPITAL AND LABOUR.

Dundee Joiners' Strike.—Acting on the decision come to by the operative joiners to strike rather than submit to a reduction of wages, a section of the men came out on the 8th inst. The dispute only affects the men employed by the associated employers, as most of the non-associated masters, to the number of about twenty, have intimated that they intend to continue to pay the old rate of wages. There are twenty-five associated firms, and they include, with two exceptions, all the larger employers of labour. Altogether, there are about 250 men still working, and the strike-roll already contains nearly 220 names.

Working Rules, Bristol Building Trade.—Reference has been made from time to time to the negotiations which have passed between the Bristol Master Builders' Association and the various operatives in the building trade, and it is gratifying to know that everything is now settled, and copies of the new working rules are being issued to the parties interested. The rule as to disputes is as follows:—"Should a dispute at any time take place between any department of the building trade and their employers, on any question of disputed interpretation or infringement of these rules that cannot be mutually arranged between the parties affected, a Board of Conciliation shall be formed, composed of four employers and four members of the trade affected, to whom all questions shall be referred. The decision of the majority of such board shall be binding on parties concerned. Such Conciliation Board shall meet within thirty-six hours of the information being laid. That in case of an equal division, each body shall appoint an arbitrator, and the two arbitrators shall themselves, in case of disagreement, appoint an umpire. The decision of such arbitrators, if unanimous, or of the umpire, to be final, binding, and conclusive."—*Western Press.*

LEGAL.

LIGHT AND AIR DISPUTE.

The case of Limburg *v.* Daniels came before Mr. Justice Farwell in the Vacation Court on the 15th inst., on a motion by the plaintiff to restrain the defendant from building so as to obstruct the plaintiff's light and air.

Mr. Alexander, Q.C., on the case being called on, said that he, on behalf of the plaintiff, had only had the defendant's affidavits put into his hands that morning, and he should ask for an adjournment of a week in order to answer them. He thought, however, that the defendant ought to give some undertaking. It was a case in which there was a very serious diminution of light. The defendant said he had built as high as he wanted to.

His Lordship asked Mr. Grantham, counsel for the defendant, if the defendant had built as high as he intended to.

Mr. Grantham: Yes, I am instructed so.

His Lordship: If you do not mean to go further it does not hurt you to say you will not.

Mr. Grantham: The wall is built, but I cannot say whether the roof is finished or not. It is a serious matter to leave the roof off.

Mr. Alexander said the defendant might put a top on the building. His lordship knew there was a great difficulty in getting a building down once it was complete. They all knew from experience that there was a great reluctance in the Courts to pull a completed building down.

His Lordship: Do you want to do anything for a week, Mr. Grantham?

Mr. Grantham: Well, we want to put on the tiles. We have been building since February, and the plaintiff did not issue his writ for an injunction till August 7.

Mr. Alexander said that directly the defendant began building the plaintiff protested, and then the defendant proceeded to modify his plans. So long as the defendant built according to modified plans the plaintiff did not object, but instead of doing that he had brought forward his wall, and that had only just been done.

His Lordship: That is done. I shall not deal with that. It is only a question of putting tiles on the roof. On the facts, as far as I can make out, the wall is finished and the roof is ready to be put on.

His Lordship, after some further discussion, said he did not think it worth while to impose terms on the defendant as the adjournment was for such a short time.

The case accordingly stood over for one week.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

7,746.—Apparatus for Use in Moulding Bricks: *J. Kay, J. Lobley, and H. Bunkall.*—By this contrivance the bricks are sprayed with oil or some other lubricant on their way from the cutting-table or mould to the finishing-press. The lubricant is fed from a main cistern, which is funnel-shaped, into a supply pipe whose lower end is bent inside the nozzle of a pipe through which a fan, or some equivalent appliance, forces hot or cold air or steam. To the press's cross-head is joined a cranked rod which automatically moves a cut-off slide, having an orifice or port, upon a double-headed pin that loosely passes through a lifting-spring beneath it; the spring holds up the slide in a raised and opened position until a bent arm touches the lower pin's head. A small supply cistern having a side or window of glass is also provided for purposes of inspection.

7,789.—Manufacture of Plaster Board, &c.: *Sackett Wall Board Company.*—The invention is for adding water to cement, plaster of Paris, and so on, during the manufacture of plaster board and similar materials. An even layer of plaster in a quiescent state is moved through a liquid bath, in order that

it may become quite saturated, by means of a carrier band through a long tank beneath a depressing-roller, the plaster being charged on to the band from a hopper and passing under an adjustable inlet or gate, and being removed with a scraper when saturated.

7,801.—PROCESS OF MOULDING BRICKS: *R. T. Hughes.*—Weighted levers force the plungers inwards in order to press the brick and form frogs or indents in opposite faces. The plungers which work through the open sides of a mould, after the kind specified in No. 6,239 of 1895, have passages for the escape of air. Upon a continuously-turning shaft is a cam which withdraws the plungers out of action, a weighted lever, moved by another cam, pushes under inclined ribs of the table a block or cover which closes the mould; a cam, a vertical connecting rod (to be raised against the cam by a spring) and a lever mounted upon a horizontal pivot operate the lower or ejecting plunger. The press is made in a duplicate form, so that a pressed brick is thrown out from one side of the machine, whilst another brick is being pressed at the other side.

7,815.—WINDOW FASTENERS: *F. J. Lowery & F. E. Billings.*—The sash, raised automatically by the pressing of a push-button, is held in place by a locking-slide; upon a vertical slide of the sash is seated a rack-bar, to be engaged with the teeth of a cog-wheel, moved by a spring, which is placed within a recess of the casing. The button's slanted edge engages in an aperture made in a spring-pressed sliding-plate, whose forked end engages with the rack-bar and is guided by slots in the window-casing. When the button is pressed, the plate's forked end becomes freed from the rack so that the sash may be lowered or raised. The engagement of a projection upon the plate with the teeth of the cog-wheel prevents the cog-wheel from being unwound when the sash is taken out.

7,836.—FLUSHING APPARATUS AND WASTE-WATER PREVENTER: *J. A Reid.*—A storage of water is provided by means of a closed cistern from which extends, downwards, a pipe having an enlarged bore; when a flush is needed, a hand valve at the end of the down pipe is opened, or the valve may be linked to the supply-cock so that when the one is open the other is shut.

7,861.—CHIMNEY CLEANING: *J. J. H. Dansard.*—Falling soot is collected in a drawer which is placed inside a housing at the bottom of a vertical chimney or flue, the drawer being secured with a screw that passes through its knob to the container or housing.

7,878.—BRICKS AND BUILDING BLOCKS: *H. Rensing.*—The articles are fashioned and moulded out of a composition of sand, slate-dust, ashes, and certain silicious substances mixed with half-slaked lime and a certain quantity of water for rendering the composition plastic; they are exposed to the action of steam under pressure in boilers, so that the material becomes converted into a hard silicate of lime. For ore briquettes, some finely-powdered ore or furnace dust is added to the admixture first described.

7,917.—PIPE JOINTS FOR CLOSETS, SINKS, &C.: *T. Robinson.*—The invention is an improvement of that specified under No. 9,564 of 1894. A double spigot-and-socket joint, which comprises, in part, a socket upon the metal soil-pipe lined with a ring of earthenware, joins the closet, sink, or other outlet to the soil-pipe, and clips that are bolted on to a disc-shaped flange serve to hold the socket in its place. By another arrangement an earthenware ring, fitted at the soil-pipe's end, forms a spigot. For purposes of ventilation a half-round ventilating horn is made upon the trap at its remoter end, so that a current of air inwards shall be promoted by the flow of the water.

7,955.—STONE-CUTTERS' MAULS: *J. A. Tulloch and J. G. Harris.*—The striking-faces of the mauls are made of two different substances, for instance, of wood and leather, &c., and their heads are similarly built up of the two substances, placed in alternate sections and layers, cemented together, and secured with plates and rivets; a cone-shaped wedge beneath the cap expands the handle in its place, and an air vent is made through the cap, in order that the head may be rendered more solid where it is compressed. The edges of the component sections and layers are bevelled.

7,983.—SWIVELLING PIPE JOINTS: *C. H. Weaver & L. H. Houghton.*—For forming a connexion between flexible pipes, two couplings are employed to which the pipe-ends are joined respectively; one coupling has a connecting-piece, on to which a washer is fitted, and it is screwed into the other coupling. Into the former coupling is screwed a recessed cap which contains a spring that forces a spider on to its seatings in the connecting piece. Several joints, set at right angles to one another, can be fitted on the pipes.

7,992.—PLANNING AND CONSTRUCTION OF BATH-ROOMS: *J. Kane.*—The inventor's arrangements concern the planning and construction of bath-rooms whereby he provides for separated bath-rooms and dressing-rooms which corridors divide from one another. According to one plan, a set of bath-rooms, a corridor, a set of dressing-rooms, and an outer corridor lie along each side of the building's middle line, the line dividing the two sets of bath-rooms thus planned. Each of the dressing-rooms, which are ranged between the inner and outer corridors, has two doors that give access to the two corridors respectively, the inner door being placed opposite the entrance into the bath-room. In a variation of the planning the bath-rooms are grouped together upon one part of the floor, and the dressing-rooms upon that floor's other part. Along the outer walls of the inner corridors are shafts and passages having side openings for the supply of warm air, and short vertical pipes that lead into the various rooms and thence into main pipes or passages serve for the exhaustion of air.

8,084.—PROCESS OF CASTING BUILDING BLOCKS OR PAVING SLABS: *W. H. Baker.*—The mould for casting slabs or blocks of cement or concrete has a perforated bottom with detachable angle-iron sides clamped on to a rectangular frame, which is loosely mounted upon the eccentric portion of a shaft to be turned by hand for rocking the mould. When the filled mould is rocked the frame bumps upon anti-friction rollers pivoted to another frame, and causes the cement to settle evenly. When the cement is well set the side lever is turned away, the mould is inverted, and its sides are unclamped, whereupon the block or slab is gently deposited upon the trolley's inclined table.

8,111.—ROAD SCARIFIERS: *H. C. E. Hulands & L. S. Hulands.*—The axle of the engine's wheel carries a U-shaped frame, to the end of which the picks are attached. The frame, which is adjusted by passing a sleeve upon one leg over the axle's end and then bolting the two parts of the sleeve around the axle, is lowered and lifted by means of a screw shaft that passes through a nut which is pivoted in brackets upon a girder connected to the tender. A bar bolted to a bridge piece is recessed for the turning therein of the shaft's head.

8,145-6.—LADDERS: *F. S. Seagrave.*—At the ladder's foot is fastened, with pins or cottars, an extended beam or base, to whose underside is affixed a metal plate, whilst the ends of the beam have channelled feet of cast-metal; between the ends of the beam and the castings wooden wedges or blocks are inserted. In the latter invention the base or beam consists of two parts, which are hinged together and slide in guides attached to the ladder; the hinge pin also slides within a slotted bar at the middle of the ladder and is attached to the bar with a cam ring, which is pivoted at the pin's end and presses against the eyes of the hinge; the movement of the beams within the guides is limited by shoulders, and slipping of the beams is prevented by serrated shoes upon their ends.

8,210.—MANUFACTURE OF PORTLAND CEMENT: *W. E. Hopps.*—Chalk, sand, sodium carbonate and gypsum are ground to a very fine powder, and are then mixed together in the respective parts of 123, 26, 5, and 4. When the materials have been passed through a brick-making machine the bricks are kiln-burned and the clinker is crushed and finely pulverised.

8,280.—TROUGH CLOSETS: *W. Oates.*—By this contrivance a channel is formed in one piece with the trough so that the customary loose bend at the end of the flushing-pipe can be discarded; a socket takes the lower end of the flushing pipe.

8,323.—CANS FOR PAINTS: *J. A. V. Bourgeois.*—For hermetically closing and sealing the can is provided a ringed collar with an extending flange, the cover—also flanged—fits over the ringed collar, and is held in place with either loose or hinged clips. A clip may be extended so as to be available for prising the cover open, and the ends of a cord or wire, which is inserted through holes in the flanges of the cover and collar, are to be sealed with lead.

MEETINGS.

FRIDAY, AUGUST 17.

Institution of Junior Engineers Summer Meeting at Newcastle-on-Tyne (concluded).—Visit to the Allhusen Works of the United Alkali Works Company; the preliminary Works of the Corporation's Electric Tramway Undertaking; summer dinner in the evening at the County Hotel, the President, the Hon. Charles A. Parsons, F.R.S., in the chair.

SATURDAY, AUGUST 18.

Architectural Association.—Summer Visit to Mereworth House, near Wateringbury, Kent.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 1.—By MORRIS, SONS, & PEARD (at Bridgwater).

Woolavington, Somerset.—Morses Farm, 144 a. 1 r. 0 p., f. (in lots)	£4,713

By Messrs. GIBSON (at Northampton).

Thornby, &c., Northants.—The Thornby Grange Estate, 294 a. 2 r. 11 p., f.	4,100

August 3.—By WESTLEY & SON (at Isleham).

Isleham, Cambs.—Various enclosures, 65 a. 3 r. 29 p., f.	560
Freehold Fen Farm, 135 a. 3 r. 3 p.	735

By W. W. READ & CO.

Southwark.—58 and 59, St. Margaret's-court, u.t. 20 yrs., g.r. 20*l.*	105

By WEATHERALL & GREEN.

Regent's Park.—137, 161, 163, and 165, Albany-st., u.t. 15 yrs., g.r. 67*l.* 10*s.*, r. 205*l.* 15*s.*	945
Redhill-st.—l.g.r.'s 59*l.* 19*s.*, u.t. 15 yrs., g.r. 16*l.* 16*s.* 8*d.*	510

By RICHARD AUSTIN.

Weymouth, Dorset.—The Gloucester Hotel, area 0 a. 2 r. 15 p., f.	10,300

August 7.—By Messrs. COBB (at Rochester).

Hoo St. Werburgh, Kent.—Enclosure of meadow land, 2 a. 0 r. 2 p., f.	£170
Grain, Kent.—Little West Field, 5 a. 0 r. 35 p., f.	220

August 8.—By FAREBROTHER, ELLIS, & CO.

Kronberg, &c., Germany.—The goodwill, stock, plant, buildings, and 50 acres of land, belonging to the Kronthal Company (as a going concern), f.	5,000
St. Pancras.—175, Euston-rd., u.t. 7½ yrs., g.r. 16*l.* 16*s.*, e.r. 75*l.*	150

By FRANKLIN & SON.

Moreton, Essex.—Southend or New House Estate, 158 a. 2 r. 17 p., f.	2,700
Nether Hall Estate, 216 a. 0 r. 32 p., f.	3,250
The Hill Farm, 42 a. 1 r. 2 p., f.	750
Shelley, Essex.—Four enclosures of meadow land, 10 a. 2 r. 16 p., c.	330
Fyfield, Essex.—Norwood End Farm, 20 a. 0 r. 1 p., c.	290
Moreton, Essex.—The Manor of Bouchers Hall, with fines, heriots, &c.	260

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	s.	d.				
Hard Stocks	34	0	per thousand alongside, in river.			
Rough Stocks and Grizzles	30	0	,,	,,	,,	,,
Smooth Bright Facing Stocks..	58	0	,,	,,	,,	,,
Shippers	42	0	,,	,,	,,	,,
Flettons.....	29	6	,,	,,	at railway depôt.	
Red Wire Cuts ..	34	0	,,	,,	,,	,,
Best Fareham Red	71	6	,,	,,	,,	,,
Best Blue Pressed Staffordshire ..	87	0	,,	,,	,,	,,
Do., Bullnose	92	0	,,	,,	,,	,,
Best Stourbridge Fire Bricks	84	6	,,	,,	,,	,,
Best White Glazed Stretchers.....	260	0	,,	,,	,,	,,
Headers	240	0	,,	,,	,,	,,
Quoins and Bullnose	340	0	,,	,,	,,	,,
Double Headers..	320	0	,,	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers ..	240	0	,,	,,	,,	,,
Quoins and Bullnose	280	0	,,	,,	,,	,,
Double Headers..	280	0	per thousand at railway depôt.			
Seconds Quality White and Dipped Salt Glazed	40	0	per thousand less than best.			

	s.	d.	
Thames and Pit Sand	8	0	per yard, delivered.
Thames Ballast	6	9	,, ,,
Best Portland Cement	36	0	per ton ,,
Best Ground Blue Lias Lime..	23	6	,, ,,

NOTE.—The cement and lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12*s.* 6*d.* per yard, delivered.
Stourbridge Fire-clay in sacks, 32*s.* 6*d.* per ton at rly. dpt.	

STONE.

		s.	d.			
Ancaster in blocks		2	0	per ft. cube, deld. rly. depôt		
Bath	,, ...	1	7	,,	,,	
Beer	,, ...	1	6½	,,	,,	
Grinshill	,, ...	1	10	,,	,,	
Brown Portland in blocks		2	2	,,	,,	
Darley Dale	,,	2	1½	,,	,,	
Red Corsehill	,,	2	5	,,	,,	
Red Mansfield	,,	2	4½	,,	,,	
Hard York	,,	2	10	,,	,,	
Hard York 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)		2	7	per ft. super. at rly. depôt.		
,, ,,	6 in. Rubbed Ditto..	2	10½	,,	,,	
,, ,,	3 in. sawn both sides slabs (random sizes)	1	3	,,	,,	
,, ,,	3 in. self-faced Ditto	0	9	,,	,,	

SLATES.

in.	in.	£	s.	d.	
20	10 best blue Bangor..	11	5	0	per 1000 of 1200 at ry. dep.
,,	best seconds ,,	10	15	0	,, ,,
16	8 best ,,	6	2	6	,, ,,
20	10 best blue Portmadoc	10	18	0	,, ,,
16	8 ,, ,,	6	0	0	,, ,,
20	10 best Eureka unfading green.....	11	2	6	,, ,,
16	8 ,, ,,	6	15	0	,, ,,
20	10 Permanent green and Sedan green	10	0	0	,, ,,
16	8 ,, ,,	5	12	6	,, ,,

TILES.

	s.	d.	
Best plain red roofing tiles..	41	6	per 1,000 at rly. depôt.
Hip and valley tiles....	3	7	per doz. ,, ,,
Best Broseley tiles	42	6	per 1,000 ,, ,,
Hip and valley tiles....	4	0	per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6	per 1,000 ,, ,,
Do. ornamental Do.	60	0	,, ,, ,,
Hip tiles.....	4	0	per doz. ,, ,,
Valley tiles.....	3	9	,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes) .	50	9	per 1,000 ,, ,,
Hip tiles	4	1	per doz. ,, ,,
Valley tiles.....	3	8	,, ,, ,,

[*See also page 163.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Municipal Buildings	South Shields Town Council	200*l.*, 100*l.*, and 50*l.*	Oct. 30
*Harbour Offices	Swansea Harbour Trustees	100*l.* and 50*l.*	Nov. 30

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Steel Gasholder Tank and Concrete Foundations	York United Gas Company	T. Newbigging & Son, Engineers, 5, Norfolk-street, Manchester	Aug. 21
Additions to Schools, Lincoln-street	Kingston School Board	Gelder & Kitchen, Architects, 76, Lowgate, Hull	do.
Electricity Station, Bloom-street	Manchester Corporation	F. E. Hughes, Town Hall	do.
Schools, Camelon	Falkirk Parish School Board	J. Strang, Architect, Vicar-street, Falkirk	do.
Laundry, &c., Bishop's Garden, Londonderry		J. G. Ferguson & Son, Architects, 20, Pump-street, Londonderry	do.
Filter Beds, &c., Hapton Reservoir (Contract No. 1)	Bury (Lancs.) Corporation	J. Cartwright, Civil Engineer, Town Hall, Bury	do.
Sewers, &c.	Brighouse Corporation	A. M. Fowler, Civil Engineer, 1, St. Peter's-square, Manchester	do.
Excavations at Hospital, Stobhill, Springburn	Glasgow Parish Council	Thomson & Sandilands, Architects, 241, West George-st., Glasgow	Aug. 22
Wall, &c., Pentre Tesa, Broughton	Wrexham R.D.C.	J. P. Evans, Engineer, Argyle Chambers, Wrexham	do.
Offices, &c., Stockton-on-Tees	South Durham Steel & Iron Co. Ld	J. J. Wilson, Architect, West Hartlepool	do.
Entrance Gate, &c., at Cemetery	Arnside Parish Council	G. L. Hogarth, Architect, Kendal	do.
Warehouse, Whitehale-road, Leeds		Smith & Tweedale, Architects, 12, South-parade, Leeds	do.
Altering Two Cottages into Shops, Morley	Littlehampton U.D.C.	Mr. Slack, 46, Gilroyd-parade, Morley	do.
*Sinking a Cast-iron Cylinder Well		Surveyor, Town Office, Littlehampton	do.
Additions to Woodgate Farm, Stratford St. Mary	Mr. T. J. McQuillan	R. T. Rookway & Son, Archts., 12, Bridgeland-street, Bideford	Aug. 23
Stabling, &c., Trimgate-street, Navan	Bakewell U.D.C.	E. Lowe, Architect, Navan	do.
Additions to House at Gasworks	Caythorpe, nr. Grantham, Sch. Bd	W. Redfearn, Town Surveyor, Bakewell	do.
Additions to Schools	Hambledon, nr. Guildford, Gdns.	T. White, School Board Offices, Caythorpe	do.
Annexe at Infirmary	War Department	E. L. Lunn, Architect, 36, High-street, Guildford	do.
Church, Avonmouth	Southmoor Colliery Co., Ltd.	G. H. Oatley, Architect, Baldwin-street, Bristol	do.
*Engine and Boiler Houses, &c.	Durham R.D.C.	Royal Engineer's Office, Tidworth House, Tidworth	Aug. 24
Offices, &c.	West Bromwich Guardians	J. W. Rousthwaite, Archt., 13, Mosley-street, Newcastle on-Tyne	do.
Four Houses, Brunton-place, Carlisle	Bingham (Notts.) School Board	G. Armstrong, Architect, 24, Bank-street, Carlisle	do.
Sewers, &c., Ludworth	Linlithgow Parish School Board	G. Gregson, Surveyor, Eastwood, Western Hill, Durham	do.
House, Helen's Bay, Belfast	Barnet U.D.C.	V. Craig, Architect, 5, Lombard-street, Belfast	Aug. 25
Brickwork at Workhouse	Worksop U.D.C.	T. Rollason, Architect, High-street, West Bromwich	do.
Additions to Schools	Messrs. T. Owen & Co., Ltd.	J. P. Dixon, Architect, Wheeler Gate, Nottingham	do.
Vestries, Lymm (Warrington) Parish Church	Mr. Robertshaw	Wright & Sons, Surveyors, Lancaster	do.
Arcade, &c., Kirkgate, Wakefield	Basford Guardians	G. E. Bolshaw, Architect, 189, Lord-street, Southport	do.
Academy	Commissioners of Public Library	J. G. Fairley, Architect, India Buildings, Edinburgh	do.
*Granite and Gravel	West Ham County Council	Surveyor's Office, Town Hall, Worksop	Aug. 27
*Electricity Supply Works	Church, Stretton (Salop) Water Co.	J. W. Rodger, Architect, 14, High-street, Cardiff	do.
Warehouse, Ely Paper Works, Cardiff	Rochdale Corporation	H. G. Luff, Architect, 64, Chapel-street, Devonport	do.
Two Houses and Stable, Kent-street, Ford, Devonport	Shoreditch Vestry	W. V. Betts, Architect, Radford-road, Old Basford	do.
Additions to Board Room at Workhouse	Lee Board of Works	Messrs. Clarkson, Architects, 136, High-street, Poplar	do.
Public Library, Commercial-road, Limehouse	Brightlingsea U.D.C.	Borough Engineer, Town Hall, West Ham, E.	do.
Sewers, &c.	H.M. Office of Works	Taylor, Sons, & Santo Crimp, C.E., 27, Great George-street	Aug. 28
Reservoir, New Pool Hollow	Committee	J. Leach, Town Hall, Rochdale	do.
Windows, &c., Marland Hospital	Bristol County Council	Vestry Clerk, Town Hall, Old-street, E.C.	do.
*Waiting Room	Camberwell Vestry	G. Whale, Board of Works Offices, Old Charlton, London	Aug. 29
Sewers, Woolwich-road	Audenshaw, Lancs., U.D.C.	See Advertisement	Aug. 30
*Ward at Angleton Asylum, Bridgend, Glamorgan	Walsall School Board	W. L. Osborne, Foresters' Hall, Brightlingsea	do.
Steel Works, Silcott-road, &c.	Richmond Guardians	Postmaster, Aldershot	Aug. 31
*Post Office at Aldershot	Tynemouth Corporation	W. H. Stephens & Sons, Architects, 13, Donegall-sq. North, Belfast	do.
Hospital, Belfast		W. Watkins & Son, Architects, St. Edmond's Chambers, Lincoln	do.
Boiler House, Laundry, &c., at Lincoln		H. Williams, Architect, 24, Clare-street, Bristol	Sept. 4
*Foundations, &c.	Tanfield U.D.C.	Surveyor's Office, Vestry Hall, Camberwell	Sept. 6
Offices, Stables, &c.	Messrs. W. H. Mallett & Co.	J. P. Wilkinson, C.E., 47, Arcade-chambers, Manchester	Sept. 8
Sewers, &c.	His Grace the Duke of Portland	Bailey & McConnal, Architects, Bridge-street, Walsall	Sept. 10
House at Schools, Palfrey	Dukinfield Corporation	See Advertisement	Sept. 17
*Infirmary Buildings and Nurses' Home		See Advertisement	Sept. 18
*Storage Reservoir, &c.	Leeds Tradesmen's Benev. Instn.	Hicks & Charlewood, Architects, 67, Westgate-road, Newcastle	No date
Restoration of Church, Deighton, near Northallerton	do.	P. B. Houfton, Architect, Furnival Chambers, Chesterfield	do.
Forty-eight Cottages, Tinsley Park Collieries, Sheffield	Messrs. F. R. Spark & Son	W. N. Wynn, C.E., 10, Livingstone-street, Roundhay-rd., Leeds	do.
Twelve Houses, Ashdown-road, Sandal	Worthing Corporation	R. Heslop, Surveyor, Burnopfield	do.
Reconstruction of Bridge, Houghal Burn		W. Swift, Architect, 38, Lemon-street, Truro	do.
Hotel (The Swan) Truro		J. C. Traylen, Architect, 15, Broad-street, Stamford	do.
Residence, West Deeping, Lincs.		G. & F. W. Hodson, Engineers, Loughborough	do.
Water Supply Works, Welbeck		S. Hague, Borough Surveyor, Dukinfield	do.
Road Works, Railway and Hope Streets		F. Osman, Fourposts, Southampton	do.
Granite Setts, &c., Southampton		A. D. Kaye, Architect, 71, Albion-street, Leeds	do.
Alterations, &c., to the Irwin Arms Inn, Leeds		Butler, Wilson, & Oglesby, Architects, 12, East Parade, Leeds	do.
Additions to 41, Park-square		do.	do.
Three Shops and Business Premises, Park-lane		do.	do.
Additions to Printing Works, Cookridge-st., Leeds		Borough Surveyor, Town Hall, Worthing	do.
*Electric Generating Station			

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Surveyor and Inspector of Nuisances	Waltham Holy Cross U.D.C.	275*l.* per annum	Aug. 22
*Clerk of Works	Coventry Corporation	3*l.* 10*s.* per week	do.
*Assistants	do.		do.
*Clerk of Works	Stafford Guardians		Aug. 24
*Assistant	Chelmsford Corporation	2*l.* 2*s.* per week	Aug. 25
*Clerk of Works	Richmond Guardians	4*l.* per week	Sept. 12

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv. vi. viii. x. & xxi. Public Appointments, pp. xviii. xix. & xxi.

PRICES CURRENT (*Continued*).

WOOD.

BUILDING WOOD.—YELLOW.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in. and 3 in. by 7 in. and 8 in.	12 10 0	13 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0	0 less than best
Battens: seconds	0 10 0	,, ,, ,,
	At per load of 50 ft.	
Fir timber: Best middling Danzig or Memel (average specification)	4 5 0	4 10 0
Seconds	3 17 6	4 5 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Swedish balks	2 15 0	3 0 0
Pitch pine timber (35 ft. average)	4 0 0	4 10

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	27 10 0	28 10 0
3 in. by 9 in.	24 0 0	25 0 0
Battens, 2½ in. and 3 in. by 7 in.	20 0 0	21 0 0
Second yellow deals, 3 in. by 11 in.	22 10 0	24 0 0
,, ,, 3 in. by 9 in.	20 0 0	21 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	18 0 0
Third yellow deals, 3 in. by 11 in. and 9 in.	16 10 0	17 10 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	24 0 0	25 0 0
Do. 3 in. by 9 in.	21 0 0	22 0 0
Battens	16 0 0	17 0 0
Second yellow deals, 3 in. by 11 in.	18 0 0	19 10 0
Do. 3 in. by 9 in.	16 10 0	17 10 0
Battens	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in.	14 10 0	15 10 0
Do. 3 in. by 9 in.	13 10 0	14 10 0
Battens	12 0 0	13 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	15 10 0	16 10 0
,, ,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 10 0	12 10 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, battens	10 10 0	11 10 0
Pitch pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—		
First, regular sizes	29 0 0	31 0 0
Broads (12 in. and up)	2 0 0	more.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Oddments	20 0 0	22 0 0
Kauri Pine—		
Planks, per ft. cube	0 3 6	0 4 0
Danzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 2 8
Small ,, ,,	0 2 4	0 2 7
Wainscot Oak Logs, per ft. cube	0 5 6	0 6 0
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 9
Mahogany—		
Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	16 0 0	20 0 0
American Whitewood Planks—		
Per ft. cube	0 2 3	0 3 0

JOISTS, GIRDERS, &c.

	In London, or delivered to Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	9 7 6	- - -
Compound Girders ,, ,,	13 10 0	- - -
Angles, Tees and Channels, ordinary sections	12 10 0	14 10 0
Flitch Plates	12 0 0	- - -

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON.—		
Common Bars	10 5 0	10 15 0
Staffordshire Crown Bars, good merchant quality	11 5 0	11 15 0
Staffordshire "Marked Bars"	13 5 0	- - -
Hoop Iron, basis price	11 5 0	11 15 0
,, ,, galvanised	17 0 0*	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	11 10 0	- - -
,, ,, to 24 g.	12 5 0	- - -
,, ,, to 26 g.	13 15 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality.—		
Ordinary sizes, 6 ft. by 2 ft. by 3 ft. to 20 g.	14 15 0	- - -
,, ,, 22 g. and 24 g.	15 5 0	- - -
,, ,, 26 g.	16 15 0	- - -
Sheet Iron, galvanised, flat, best quality.—		
Ordinary sizes to 20 g.	18 10 0	- - -
,, ,, 22 g. and 24 g.	19 0 0	- - -
,, ,, 26 g.	20 10 0	- - -
Galvanised Corrugated Sheets.—		
Ordinary sizes, 6 ft. to 8 ft 20 g.	14 0 0	14 15 0
,, ,, 20 g. and 24 g.	14 15 0	15 10 0
Cut nails, 3 in. to 6 in. (Under 3 in. usual trade extras.)	11 10 0	- - -

PRICES CURRENT (*Continued*).

	£ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	20 7 6	- - -
Pipe in coils	20 17 6	- - -
ZINC—Sheet—		
Vieille Montagne ton	28 0 0	- - -
Silesian	27 10 0	- - -
COPPER—		
Strong per lb.	0 1 0	- - -
Thin ,,	0 1 2	- - -
Copper nails ,,	0 1 3	- - -
TIN—English Ingots ,,	0 1 7	- - -
SOLDER—Plumbers' ,,	0 0 8	- - -
Tinmen's ,,	0 0 10	- - -
Blowpipe ,,	0 1 0	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	2¾d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, ,, fourths	3d. ,, ,,
26 oz. thirds	4¼d. ,, ,,
,, ,, fourths	4d. ,, ,,
32 oz. thirds	5¼d. ,, ,,
,, ,, fourths	5d. ,, ,,
Fluted sheet, 15 oz.	3¼d. ,, ,,
,, ,, 21 ,,	4¼d. ,, ,,
½ Hartley's Rolled Plate	3d. ,, ,,
⅝ ,, ,, ,,	3¼d. ,, ,,
¾ ,, ,, ,,	4d. ,, ,,

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes per gallon	0 3 1
,, ,, ,, in barrels ,,	0 3 2
,, ,, ,, in drums ,,	0 3 4
Boiled ,, ,, in pipes ,,	0 3 4
,, ,, ,, in barrels ,,	0 3 5
,, ,, ,, in drums ,,	0 3 7
Turpentine, in barrels ,,	0 2 11
,, in drums ,,	0 3 2
Genuine Ground English White Lead ...per ton	27 10 0
Red Lead, Dry ,,	25 0 0
Best Linseed Oil Putty per cwt.	0 9 6
Stockholm Tar per barrel	1 7 0

VARNISHES, &c.

	per gallon. £ s. d.
Fine Elastic Copal Varnish for outside work	0 16 6
Best Elastic Copal Varnish for outside work	1 0 0
Best Elastic Carriage Varnish for outside work	0 16 6
Best Hard Oak Varnish for inside work	0 10 6
Best Extra Hard Church Oak Varnish for inside work	0 10 6
Fine Hard Copal Varnish for inside work	0 16 0
Best Hard Copal Varnish for inside work	1 0 0
Best Hard Carriage Varnish for inside work	0 16 0
Extra Pale Paper Varnish	0 12 0
Best Japan Gold Size	0 10 0
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 9 0
Berlin Black	0 15 6
Knotting	0 10 0
Best French and Brush Polish	0 10 0

TO CORRESPONDENTS.

H. C. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BILSTON.—For extensions to St. Martin's Schools, Bradley. Mr. R. J. Rowe, architect, Crescent, Bilston. Quantities by architect:—

Field	£1,287 0 0	Cave	£967 0 0
Herbert	1,065 0 0	Gough	925 0 0
Skett	1,000 0 0	Morrell Bros., Bilston*	870 0 0
Hallett	998 9 8		

BRAMLEY.—For alterations and additions to National schools. Mr. W. G. Lower, architect, 12A, High-street, Guildford:—

J. W. Humphreys	£970 0 0	S. Ellis, Bramley*	£815 0 0
Drowley & Co.	904 0 0	Bunning & Son	810 0 0
Tribe & Robinson	900 0 0	F. Parsons	807 9 3
F. Milton	816 0 0	P. C. May (Executors of)	798 0 0

CHATHAM.—For alterations and additions to St. Bartholomew's Hospital, Chatham. Mr. Edwin T. Hall, architect, 57, Moorgate-street, London, E.C.:—

Holland & Hannen	£14,903	J. H. Harris	£12,929
Lawrence & Sons	14 695	C. E. Skinner	12,598
Holloway Bros.	13,950	Wallis & Sons	12,520
Foster & Dickson	12,945	West Bros.	12,249

Plumbing Work, &c.

Doulton & Co., Ltd.	£1,177	Dent & Hellyer	£1,074
G. Jennings	1,148		

COVENTRY.—For additions to schools, Exhall, for the School Board. Mr. T. F. Tickner, architect, 7½ Bishop-street, Coventry:—

T. Wright	£399 17 6	Shortridge & Denyer	£332 12 10
T. Gibson	395 0 0	H. Goode	325 0 0
T. G. Golby	380 0 0	J. Goode, Exhall*	298 10 0
L. Bunney	339 0 0		
Kelley & Son	335 0 0		
Watts & Edmonds	334 13 8		

FETCHAM PARK, LEATHERHEAD (Surrey).—For drainage works, for Mr. J. Barnard Hankey. Mr. A. J. Hardwick, surveyor, Eagle Chambers, Kingston-on-Thames. Quantities by Mr. Ernest R. Babbs, 48½ Bishopsgate-street Within, E.C.:—

	Sewage disposal works.	Sewers.	Total.
Steven Kavanagh	£502 11 0	£791 7 6	£1,293 18 6
Ross, Wilks, & Crabtree, Shipley, Yorks*	427 12 6	673 19 0	1,101 12 6

HULL.—For the erection of three blocks of dwellings, Great Passage-street, for the Corporation. Mr. J. H. Hirst, City Architect, Town Hall, Hull:—

Jackson & Sons	£11,858	F. Beilby	£10,300
H. Kaye	10,767	G. Houlton	9,960
C. Greenwood	10,694	M. Harper	9,874
H. Moody	10,113	T. Goates*	9,750

[All of Hull.]

HULL.—For pulling down premises and erecting larder, meat, and other store buildings at the workhouse. Messrs. Freeman, Son, & Gaskell, architects, Hull:—

Lightowler & Son, Hull* £270

KINGSTON-ON-THAMES.—For repairs and alterations to Clydesdale, for the Hon. Geo. Savile. Mr. A. J. Hardwick, architect, Kingston:—

Offer & Sons	£393	E. Tomkinson	£359
Lane & Son	380	Gaze & Sons*	349
G. J. Havell	370		

LEICESTER.—For the erection of a chimney-shaft and refuse-destructor buildings, West Humberstone, for the Corporation. Mr. E. G. Mawbey, C.E., Town Hall, Leicester:—

Contract No. 1.—Chimney Shaft.

Needham Bros.	£2,399 5 0	Moss & Son, Ltd.	£1,814 13 4
Bradshaw Bros.	2,380 4 6	Thomas Herbert	1,756 0 0
Myles & Warner	2,173 6 1	Leicester Builders, Ltd.	1,746 0 0
A. & W. Chambers	2,000 0 0	Johnson & Son	1,649 0 0
Williamson & Co.	1,876 11 11	Thos. Smart, Nottingham*	1,500 0 0
Herbert & Sons	1,850 16 10		
Main, Kendall, & Main	1,823 10 0		

Contract No. 2.—Destructor Buildings.

Geo. Duxbury	£5,353 10 3	Johnson & Son	£4,726 11 4
Bradshaw Bros.	4,981 0 0	Needham Bros.	4,609 11 0
Leicester Builders, Ltd.	4,951 0 0	Herbert & Sons	4,549 15 8
A. E. Tilley	4,914 17 8	Williamson & Co.	4,463 13 9
Thos. Herbert	4,900 0 0	Moss & Son, Ltd., Loughborough*	4,440 15 11
Main, Kendall, & Main	4,895 7 0		

LLWYNPIA.—For the erection of a house, for Messrs. A. & N. Meredith. Messrs. Griffiths & Jones, architects, Tonypandy:—

Jonathan Jones, Coedpenmaen, Pontypridd* £410 10

[Boundary walls and plumbers' work not included.]

LONDON.—For heating the Gideon-road school, for the School Board for London:—

Wippell Bros. & Row	£550
Oldroyd & Co., Ltd.	529
Turner & Co.	495
Cannon & Sons	480
Brightside Foundry & Engineering Co., Ltd.	445
G. Davis	435
Williams & Sons, Ltd.	399
Bates & Sons*	385

[*See also next page.*

NORTHFLEET.—For the erection of new schools at Old Dover-road, Northfleet, for the Northfleet School Board. Mr. S. I. Adams, architect, Weston-chambers, Southend-on-Sea :—

	Schools.	Pavings, &c.	Caretaker's House.	Total.
Messrs. Foster	£10,148 0 0	£4,760 0 0	£947 0 0	£15,855 0 0
Messrs. Beal & Hubbard	8,242 5 4	3,692 2 3	728 19 3	12,573 6 10
Messrs. Davis & Leaney	8,100 0 0‡	3,700 0 0	—	11,800 0 0
Messrs. Davey Brothers	8,075 0 0‡	2,955 0 0	—	11,030 0 0
Messrs. Dupont & Co.	7,263 10 0	2,862 0 0	661 10 0	10,787 0 0
Messrs. Multon & Wallis	7,321 0 0†	1,026 0 0	634 0 0	10,795 0 0
		931 0 0†		
		329 0 0†		
		554 0 0†		
		2,840 0 0		

Messrs. Multon & Wallis's tender has been accepted, for schools, £7,321 †; boundary walls, £931 †; latrines, £329 †; drainage and filtering tanks, £554 †; total, £9,135.
‡ This includes caretaker's house.

LONDON.—For repairs and decorations, The Albion, public-house, Stoke Newington. Messrs. Foulsham & Herbert Riches, architects, 3, Crooked-lane, King William-street, E.C., and Bromley-by-Bow, E. :—

J. & W. Inkpen	£645	Sheffield Bros	£540
Fisher, Finn, & Co.	607	T. Dartnall*	530

ROEHAMPTON.—For residence. Mr. A. J. Hardwick, architect. Quantities by Mr. E. R. Babbs, 48, Bishopsgate-street Within, E.C. :—

Marriage & Witherington	£1,475	W. H. Lorden	£1,288
Gaze & Son	1,386	Kelsey & Sons, Chessington*	1,146

SOUTHBOROUGH.—For the erection of school buildings, High Brooms. Messrs. H. H. & E. Cronk, architects, 4, Mount Ephraim-road, Tunbridge Wells :—

Bowman & Sons	£1,920 0	Strange & Sons	£1,720 18
J. Jarvis	1,821 14	J. N. Jeffery	1,682 0
Martin & Co.	1,805 0		

STONEHAVEN, N.B.—For the erection of a villa on Slug-road, for Mr. A. E. P. Gardner. Mr. J. Augustus Souttar, architect, 41, Bishopsgate-street Within, London, E.C. Quantities by architect :—

Masonry.—Smith & Co., Stonehaven*	£558 0 0
Carpentering.—Thomson & Sons, Stonehaven*	484 10 0
Slating.—R. Burness, Stonehaven*	70 18 6
Plumbing.—J. Worling, Aberdeen*	150 0 0
Plastering.—A. Stephen, Stonehaven*	76 17 0
Painting and Glazing.—E. Copland, Aberdeen*	75 15 0
	£1,416 0 6

SUTTON (Surrey).—For additions to Foxbury, Worcester-road, for Mr. A. Emslie. Mr. J. Augustus Souttar, architect, 41, Bishopsgate-street Within, London, E.C. :—

F. J. Shopland, Sutton* £359

SWANSEA.—For the erection of ice factory and cold stores, Swansea; other work to be done to additional contracts. Messrs. Freeman, Son, & Gaskell, architects, Hull :—

Lloyd Bros., Swansea £3,681 7 5

THAMES DITTON (Surrey).—For cottage in Ashley-road, for Mr. J. Hart. Mr. A. J. Hardwick, architect, Eagle Chambers, Kingston-on-Thames. Quantities by Mr. E. R. Babbs, 48, Bishopsgate-street Within, E.C. :—

E. D. Hobbs* £683 10 0

TUNBRIDGE WELLS.—For the erection of two cottages at sewage farm, for the Town Council. Mr. W. H. Maxwell, Borough Surveyor, Town Hall, Tunbridge Wells :—

J. Marshall	£793 0 0	F. Skinner	£727 17 10
Crates & Son	730 0 0	J. N. Jeffery	717 0 0

WEST HARTLEPOOL.—For the erection of banking premises, Church and Lynn streets, for the Yorkshire Penny Bank. Mr. J. Garry, architect, 47, Church-street, West Hartlepool. Quantities by Mr. Geo. Bell, 13, Westgate-road, Newcastle :—

Leeder & Son	£6,223	Watt Bros., West Hartlepool‡	£4,896
Howe & Co.	5,039		

‡ Accepted, exclusive of fittings, which are of polished teak.

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